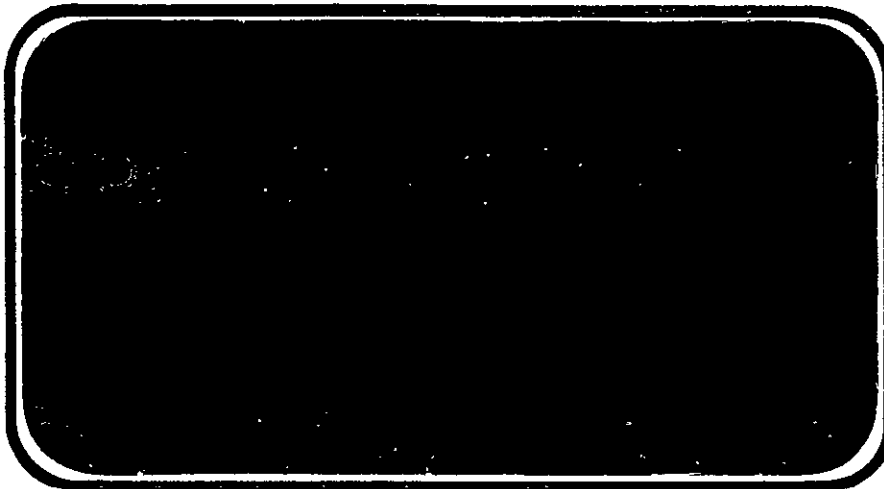




NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

NASA CR-

141828



(NASA-CR-141828) HEAT TRANSFER TESTS ON A
0.01-SCALE ROCKWELL CONFIGURATION 3 SPACE
SHUTTLE ORBITER AND TANK (37-OT) IN THE
CALSPAN 48-INCH HYPERSONIC SHOCK TUNNEL
(OH12/IH21), VOLUME 1 (Chrysler Corp.)

N76-16141

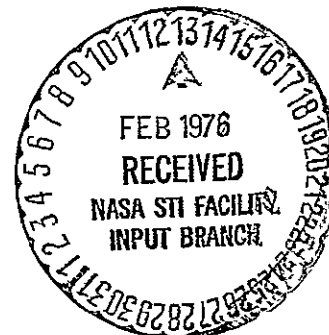
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SPACE SHUTTLE

AEROTHERMODYNAMIC DATA REPORT



JOHNSON SPACE CENTER

HOUSTON, TEXAS

DATA Management services

SPACE DIVISION



CHRYSLER
CORPORATION

October, 1975

DMS-DR-2164
NASA CR-141,828

VOLUME 1 OF 3

HEAT TRANSFER TESTS ON A 0.01-SCALE
ROCKWELL CONFIGURATION 3 SPACE SHUTTLE ORBITER
AND TANK (37-OT) IN THE CALSPAN 48-INCH
HYPERSONIC SHOCK TUNNEL (OH12/IH21)

by

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Prepared under NASA Contract Number NAS9-13247

by

Data Management Services
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New Orleans, La. 70189

for

Johnson Space Center
National Aeronautics and Space Administration
Houston, Texas

WIND TUNNEL TEST SPECIFICS:

Test Number: Calspan 48 HST-173-100
NASA Series Number: OH12/IH21
Model Number: 37-OT
Test Dates: October 29 through December 15, 1973

FACILITY COORDINATOR:

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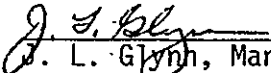
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HEAT TRANSFER TESTS ON A 0.01-SCALE
ROCKWELL CONFIGURATION 3 SPACE SHUTTLE ORBITER AND
TANK (37-OT) IN THE CALSPAN 48-INCH
HYPERSONIC SHOCK TUNNEL (OH12/IH21)

by

M. Kotch, Rockwell International Space Division

ABSTRACT

This report presents model information and data from wind tunnel tests conducted on 0.01-scale models of the Rockwell Space Shuttle Orbiter and External Tank. These tests were conducted in the Calspan 48" Hypersonic Shock Tunnel to determine heating rates on ascent and re-entry configurations at various Reynolds numbers, Mach numbers and angles of attack.

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PLOTTED COEFFICIENTS SCHEDULE:

- A) H/H_{REF} versus X/L and HI/HU versus X/L
- B) H/H_{REF} versus X/C and HI/HU versus X/C
- C) H/H_{REF} versus Z/BV and HI/HU versus Z/BV
- D) H/H_{REF} versus X/L
- E) H/H_{REF} versus X/C
- F) H/H_{REF} versus Z/BV

INTRODUCTION

A 0.01-scale orbiter/external tank heat transfer model (number 37-OT) was tested in the Calspan 48" Hypersonic Shock Tunnel from October 29 through December 15, 1973. The NASA/Rockwell designation for this test was OH12/IH21, and the Calspan facility test number was I73-100.

The purpose of this test was to determine ascent and entry heat transfer rates for the external tank and the Configuration 3 Orbiter over a range of Mach numbers from 6.95 to 19.5 and Reynolds numbers/foot from 0.0095×10^6 to 6.5×10^6 . Of particular interest was the determination of orbiter wing leading edge heating during entry, with both laminar and turbulent boundary layer conditions.

A total of 58 good program runs was made out of 73 attempts. Fifteen runs were no good because of facility malfunction or off scale heating rate data. This test is also documented in Reference 2 (a Calspan Technical Report).

NOMENCLATURE

| <u>Symbol</u> | <u>Plot Symbol</u> | <u>Definition</u> |
|---------------|------------------------|--|
| b | B | wing span, inches |
| c | C | local wing chord, inches |
| C_h | | Stanton number $\frac{778 \dot{q}_w}{\rho_\infty U_\infty (rH_o - H_w)}$ |
| h | H | heat-transfer coefficient, $778 (32.17) \dot{q}/(rH_o - H_w)$, lbm/ft ² sec |
| H | | Enthalpy, ft. lbs/slug |
| L | L | fuselage length, inches |
| M | MACH | Mach number |
| OMS | | Orbital Maneuvering System |
| P | P | Pressure, psia |
| P_r | | Prandtl number |
| q | | Dynamic pressure, psia |
| \dot{q} | QDOT | heat transfer rate, BTU/ft ² sec |
| RCS | | reaction control system |
| r | HAW/HT | recovery factor |
| Re/ft | RE/FT | Reynolds number per unit length, $\frac{\rho_\infty U_\infty}{\mu_\infty}$ |
| S | | wing span, inches |
| T | T | temperature, °R |
| t | | time, seconds |
| U | | velocity, ft/sec |
| X | X | longitudinal distance, inches |
| Y | Y | spanwise distance, inches |

NOMENCLATURE (Continued)

| <u>Symbol</u> | <u>Plot Symbol</u> | <u>Definition</u> |
|-----------------|------------------------|--|
| Z | Z | vertical distance, inches |
| α | ALPHA | angle of attack, degrees |
| β | BETA | angle of sideslip, degrees |
| γ | | specific heat ratio |
| μ | | absolute viscosity, slugs/ft-sec |
| ρ | | density, slugs/ft ³ |
| ϕ | PHI | Orbiter and external tank fuselage angular coordinate, deg. measured clockwise looking forward, 0 degrees at bottom centerline |
| o | | nozzle supply conditions |
| o' | | stagnation conditions behind a normal shock |
| 1 | | initial driven gas condition |
| ms | | model station |
| 4 | | gas conditions behind reflected shock |
| i | | incident shock in driven gas |
| ts | | test section initial conditions |
| w | | initial conditions at model surface |
| ∞ | | free stream or test section conditions |
| H _{aw} | HAW | adiabatic wall enthalpy |
| H _t | HT | free stream total enthalpy |

NOMENCLATURE (Concluded)

| <u>Symbol</u> | <u>Plot Symbol</u> | <u>Definition</u> |
|---------------|---------------------------|--|
| h_{ref} | HREF | reference heat-transfer coefficient, value obtained at stagnation point on a one foot diameter sphere |
| h/h_{ref} | H/HREF | ratio of model heat-transfer coefficient to heat-transfer coefficient of reference sphere for $H_{aw}/H_t = X.XXX$ |
| | HI/HU | interference to undisturbed heat transfer coefficient ratio |
| | X/C | chordwise location, fraction of local chord |
| | X/L | longitudinal location, fraction of body length |
| | 2Y/B | spanwise location, fraction of semi-span |
| | Z/BV | spanwise location on vertical tail, fraction of exposed span |
| | RN/L | Reynolds number per unit length |
| | RN/L1, RN/L2, RN/L3 | designates the Reynolds number schedule defined by table I |

CONFIGURATIONS INVESTIGATED

Model 37-OT is a 0.01-scale model of the Space Shuttle configuration 3 Orbiter and external tank constructed of 17-4 PH stainless steel. The orbiter is a sting mounted full-span model, with OMS/RCS pods. The external tank is equipped with removable protuberances (lines and attachment struts) and was mounted on a separate sting which was either coupled with the orbiter sting or mounted separately on the tunnel support fixture. The figures and photographs at the back of this text illustrate orbiter and external tank details. Model 37-OT was designed and built by Grumman Aerospace Corp. with instrumentation built and installed by Calspan Corporation.

Model nomenclature used for the configuration 3 Orbiter and external tank was as follows:

| | |
|------------------|-------------------------------------|
| B ₁₇ | Orbiter body |
| C ₇ | Canopy |
| E ₂₂ | Elevon |
| F ₅ | Body flap |
| M ₄ | OMS pod |
| R ₅ | Rudder |
| T ₁₀ | External tank |
| T ₁₆ | External tank without protuberances |
| V ₇ | Vertical tail |
| W ₁₀₃ | Wing |

Model dimensional data are given in Table III. Table II outlines model configurations and tunnel conditions investigated. The following configuration notation is used:

CONFIGURATIONS INVESTIGATED (Concluded)

O = Orbiter = B₁₇ C₇ E₂₂ F₅ M₄ R₅ V₇ W₁₀₃

T = external tank = T₁₀

T-NP = external tank without protuberances, support structure, or
lines = T₁₆

MODEL INSTRUMENTATION

Model instrumentation for 37-OT consisted of 158 thin-film heat transfer gages. Ninety-eight (98) of these gages were on the orbiter, the remaining sixty (60) were on the external tank. Orbiter and tank gage locations are illustrated in figure 2 and tabulated in Table IV. Photographs in figure 3 may clarify questions about gauge locations.

The thin-film gages consisted of a platinum film fused to a pyrex insulating substrate and protected from the free stream by a thin dielectric coating of magnesium fluoride. Transient surface temperature is determined by measuring the instantaneous gage resistance change which varied linearly with temperature. An excellent description of thin-film gage theory and operation can be found in Reference 1.

Tunnel conditions were determined by quick-response pressure transducers and a reference stagnation heat-transfer gage.

Data acquisition equipment, provided by Calspan, consisted of the Calspan NAVCOR 48-channel data acquisition system, one 14-channel high-speed FM tape recorder, and twenty-two 2-channel recording oscilloscopes. The NAVCOR system provided both a temperature and heat-transfer rate history for each channel, while the oscilloscopes recorded only heat-transfer rate. This rate was derived from an analog network which converted the gage temperature signal to a heat transfer rate signal. The tape recorder was used only as a temporary storage of temperature histories and was input into the NAVCOR following each run for a record of temperature and heat transfer rate.

MODEL INSTRUMENTATION (Concluded) .

Additional instrumentation consisted of a tunnel Schlieren photograph system, which provided qualitative flow information for each run. Sample Schlieren photographs are included in figure 3.

TEST FACILITY DESCRIPTION

The 48-inch Hypersonic Shock Tunnel (HST) employs a constant-area shock tube with an 8-inch inner diameter. The driver tube is 20 feet long and is externally heated by a resistance heater to temperatures of 1400° R. The driven tube is 50 feet long. The driver gas is generally a mixture of helium and nitrogen with a maximum helium purity of 100% while the driven gas is generally air. Steady-flow test times of duration sufficient to permit accurate measurement of the various parameters of interest are achieved with the tailored-interface technique.

Three axisymmetric nozzles are available to expand the test gas to high velocities:

| <u>Nozzle</u> | <u>Type</u> | <u>Exit Diameter in inches</u> | <u>Test Section Mach Number</u> |
|---------------|-------------------------|------------------------------------|-------------------------------------|
| A | Contoured | 24 | 5.5 to 8 |
| D | Contoured | 48 | 10 to 16 |
| E | 10-1/2° Semi-angle cone | 48 | 9 to 20 |

The contoured nozzles provide parallel flow with no pressure gradients in the streamwise direction for several feet. This is very important since the presence of a streamwise pressure gradient can have a significant effect on model test results. The nozzles employ replaceable throat inserts of different diameters so that with the particular nozzle, the test Mach number can be varied. Test air passes downstream of the test section into a receiver tank of a size sufficient to maintain the desired flow for durations of 5 to 13 milliseconds. All nozzles have been calibrated using pitot-pressure survey rakes over the Mach number range indicated.

TEST FACILITY DESCRIPTION (Concluded)

The Test Section is equipped with two 16-inch diameter Schlieren windows mounted a short distance aft of the nozzle exit.

TEST PROCEDURE

Model 37-0T was mounted via the model sting(s) to the tunnel support fixture at the tunnel centerline. Instrumentation wiring was routed through the base stings to a tunnel instrumentation patch panel. Figures 2a and b show the orbiter alone and the second stage configuration installations, respectively.

A typical test procedure was as follows:

1. Set model angles-of-attack, if necessary.
2. Install tunnel diaphragms and proper tunnel nozzle orifice.
3. Evacuate test section, set instrumentation gains and calibrate oscilloscopes from heating rate estimates, and check gage resistances for weak or damaged gages.
4. Close driver and load driven tube for proper test conditions. Take no-flow Schlieren picture.
5. Load driver to proper mixture and pressure for test conditions.
6. Fire tunnel for run.
7. Evacuate test section for post-run gage checks, then bring test section to atmosphere and break tunnel joints. Read out data.
8. Clean tunnel and inspect model.

DATA REDUCTION

Data for this test were reduced according to standard Calspan data reduction procedures. NAVCOR recordings and Polaroid film oscilloscope records of heat transfer rates were made available after each run. Following the test, all data records were read and assembled for computerized data reduction.

This report contains a listing of heat transfer coefficient H/H_{REF} and heat transfer rate $QDOT$. H/H_{REF} values are presented for three recovery factors $r = .85, .9$ and 1.0 . Plotted data illustrate the effect of recovery factor, angle of attack and Reynolds number on heat transfer. The postscript on RN/L indicates the Reynolds number schedule defined by table I. Heat transfer changes between undisturbed and mated configurations is illustrated by H_I/H_U plots. The plotted and tabulated data are arranged in the following manner:

| VOLUME NO. | CONTENTS |
|------------|---|
| 1 | Plots showing the effect of recovery factor on orbiter and external tank heat transfer for both undisturbed and mated configurations. Figure 4 through Figure 17 |
| 2 | Plots showing the effect of angle of attack and Reynolds number on the undisturbed orbiter heat transfer Figure 18 through Figure 35 |

DATA REDUCTION (Concluded)

VOLUME
NO.

3 Tabular listing of source data
H/HREF ~ heat transfer coefficient data

| Component | Fourth Character* | Page |
|---|----------------------|---------|
| orbiter fuselage | B | 1 |
| orbiter wing | W | 75 |
| orbiter vertical tail | V | 180 |
| orbiter wing leading edge (see Detail A fig. 2b) | A | 219 |
| orbiter wing leading edge (see Detail B fig. 2b) | C | 254 |
| external tank | T | 323 |
| QDOT ~ heat transfer rate is arranged in the same manner | | 365-512 |

* The fourth character in each dataset identifier (i.e., RUGBXX, B for Fuselage) represents the individual component.

REFERENCES

1. Vidal, R. J., "Model Instrumentation Techniques for Heat Transfer and Force Measurements in a Hypersonic Shock Tunnel," Cornell Aeronautical Laboratory Report No. AD-917-A-7, February, 1956.
2. Patten, J. S., "An Experimental Investigation of the Ascent and Descent Heating on a 0.01-Scale Model of the Space Shuttle," Calspan Technical Report, March, 1974.
3. Foust, J. W., "Pretest Information for Testing the 0.010-Scale Space Shuttle Heat Transfer Model 37-OT in the Calspan Hypersonic Shock Tunnel," SD73-SH-0198, dated July 11, 1973.

TABLE I.

| TEST : OH-12, IH-21 | | DATE : 5/3/74 | |
|---------------------|---|---------------------------------------|---|
| TEST CONDITIONS | | | |
| MACH NUMBER | REYNOLDS NUMBER (per unit length) (1/Ft) | DYNAMIC PRESSURE (pounds/sq. inch) | STAGNATION TEMPERATURE (degrees Rankine) |
| 6.95 | 0.10×10^6 | 1.35 | 5575 |
| 7.6 | 1.19×10^6 | 2.75 | 2000 |
| 7.9 | 6.5×10^6 | 10.2 | 1550 |
| 8.0 | 1.19×10^6 | 3.22 | 2600 |
| 10.2 | 2.0×10^6 | 4.03 | 2725 |
| 10.5 | 0.86×10^6 | 2.71 | 3200 |
| 12.0(sch 1) | 0.20×10^6 | 0.73 | 3925 |
| 12.0(sch 3) | 0.86×10^6 | 0.26 | 3475 |
| 15.6(sch 1) | 0.035×10^6 | 0.07 | 3650 |
| 15.6(sch 3) | 0.20×10^6 | 0.36 | 3500 |
| 18.5 | 0.0095×10^6 | 0.017 | 4400 |
| 19.5 | 0.035×10^6 | 0.065 | 4650 |
| 15.6(sch 2) | 0.3×10^6 | 0.61 | 3841 |
| | | | |
| | | | |
| | | | |

BALANCE UTILIZED: _____

| | CAPACITY: | ACCURACY: | COEFFICIENT TOLERANCE: |
|----|-----------|-----------|------------------------|
| NF | _____ | _____ | _____ |
| SF | _____ | _____ | _____ |
| AF | _____ | _____ | _____ |
| PM | _____ | _____ | _____ |
| RM | _____ | _____ | _____ |
| YM | _____ | _____ | _____ |

COMMENTS:

22

NP denotes ET without protuberances
* Nominal Values-check individual runs for values

Table III Model Dimensional Data

MODEL COMPONENT : BODY - B₁₇

GENERAL DESCRIPTION : Fuselage, 3 configuration, lightweight orbiter

MODEL SCALE: 0.010

DRAWING NUMBER : VL70-000139

| DIMENSIONS : | FULL SCALE | MODEL SCALE |
|------------------------|---------------|---------------|
| Length , In. | <u>1290.3</u> | <u>12.903</u> |
| Max Width , In. | <u>267.6</u> | <u>2.676</u> |
| Max Depth, In. | <u>244.5</u> | <u>2.445</u> |
| Fineness Ratio | <u>4.822</u> | <u>4.822</u> |
| Area - Ft ² | <u></u> | <u></u> |
| Max. Cross-Sectional | <u>386.67</u> | <u>3.867</u> |
| Planform | <u></u> | <u></u> |
| Wetted | <u></u> | <u></u> |
| Base | <u></u> | <u></u> |

Table III (Cont'd)

MODEL COMPONENT : CANOPY - C₇

GENERAL DESCRIPTION : Configuration 3

MODEL SCALE: 0.010

DRAWING NUMBER: VL70-000139

| DIMENSIONS : | FULL SCALE | MODEL SCALE |
|---|-----------------------------|-----------------------------|
| Length($X_0 = 433$ to $X_0 = 578$), In. | <u>145.00</u> | <u>1.450</u> |
| Max Width | <u> </u> | <u> </u> |
| Max Depth | <u> </u> | <u> </u> |
| Fineness Ratio | <u> </u> | <u> </u> |
| Area | <u> </u> | <u> </u> |
| Max. Cross-Sectional | <u> </u> | <u> </u> |
| Planform | <u> </u> | <u> </u> |
| Wetted | <u> </u> | <u> </u> |
| Base | <u> </u> | <u> </u> |

Table III (Cont'd)

MODEL COMPONENT: ELEVON - E₂₂GENERAL DESCRIPTION: Configuration 3. Data for 1 of 2 sides.MODEL SCALE: 0.010DRAWING NUMBER: VL70-000;139

| <u>DIMENSIONS:</u> | <u>FULL-SCALE</u> | <u>MODEL SCALE</u> |
|---|-------------------|--------------------|
| Area - Ft ² | <u>205.52</u> | <u>0.0206</u> |
| Span (equivalent) , In. | <u>353.34</u> | <u>3.533</u> |
| Inb'd equivalent chord, In. | <u>114.78</u> | <u>1.148</u> |
| Outb'd equivalent chord , In. | <u>55.00</u> | <u>0.550</u> |
| Ratio movable surface chord/ total surface chord | | |
| At Inb'd equiv. chord | <u>0.208</u> | <u>0.208</u> |
| At Outb'd equiv. chord | <u>0.400</u> | <u>0.400</u> |
| Sweep Back Angles, degrees | | |
| Leading Edge | <u>0.00</u> | <u>0.00</u> |
| Tailing Edge | <u>-10.24</u> | <u>-10.24</u> |
| Hingeline | <u>0.00</u> | <u>0.00</u> |
| (Product of area & c) | | |
| Area Moment, (Normal to Hingeline), Ft ³ | <u>1548.07</u> | <u>0.0015</u> |

Table III (Cont'd)

MODEL COMPONENT : BODY FLAP - F₅

GENERAL DESCRIPTION : Configuration 3

MODEL SCALE: 0.010

DRAWING NUMBER : VL70-000139

| DIMENSIONS : | FULL SCALE | MODEL SCALE |
|------------------------|-----------------------------|-----------------------------|
| Length , In. . | <u>84.70</u> | <u>0.847</u> |
| Max Width, In. | <u>267.6</u> | <u>2.676</u> |
| Max Depth | <u> </u> | <u> </u> |
| Fineness Ratio | <u> </u> | <u> </u> |
| Area - Ft ² | <u> </u> | <u> </u> |
| Max. Cross-Sectional | <u> </u> | <u> </u> |
| Planform | <u>142.5</u> | <u>0.014</u> |
| Wetted | <u> </u> | <u> </u> |
| Base | <u>38.096</u> | <u>0.0038</u> |

Table III. (Cont'd)

MODEL COMPONENT : OMS POD - M₄

GENERAL DESCRIPTION : Configuration 3

NOTE: Identical to M₃, except inte section to fuselage.

MODEL SCALE: 0.010

DRAWING NUMBER: VL70-000139

| DIMENSIONS : | FULL SCALE | MODEL SCALE |
|----------------------|-----------------------------|-----------------------------|
| Length , In. | <u>346.0</u> | <u>3.460</u> |
| Max Width , In. | <u>108.0</u> | <u>1.080</u> |
| Max Depth , In.. | <u>113.0</u> | <u>1.130</u> |
| Fineness Ratio | <u> </u> | <u> </u> |
| Area | <u> </u> | <u> </u> |
| Max. Cross-Sectional | <u> </u> | <u> </u> |
| Planform | <u> </u> | <u> </u> |
| Wetted | <u> </u> | <u> </u> |
| Base | <u> </u> | <u> </u> |

Table III (Cont'd)

MODEL COMPONENT: RUDDER - R₅GENERAL DESCRIPTION: Configuration 2A, 3, 3A and 140A/BMODEL SCALE: 0.010DRAWING NUMBER: VL70-000146A, -000095, -000139

| <u>DIMENSIONS:</u> | <u>FULL-SCALE</u> | <u>MODEL SCALE</u> |
|---|-------------------|--------------------|
| Area - Ft ² | <u>100.15</u> | <u>0.0100</u> |
| Span (equivalent), In. | <u>201.0</u> | <u>2.010</u> |
| Inb'd equivalent chord, In. | <u>91.585</u> | <u>0.916</u> |
| Outb'd equivalent chord, In. | <u>50.833</u> | <u>0.508</u> |
| Ratio movable surface chord/ total surface chord | | |
| At Inb'd equiv. chord | <u>0.400</u> | <u>0.400</u> |
| At Outb'd equiv. chord | <u>0.400</u> | <u>0.400</u> |
| Sweep Back Angles, degrees | | |
| Leading Edge | <u>34.83</u> | <u>34.83</u> |
| Tailing Edge | <u>26.25</u> | <u>26.25</u> |
| Hingeline (Product of area & \bar{c}) | <u>34.83</u> | <u>34.83</u> |
| Area Moment (Normal to hingeline), Ft ³ | <u>610.92</u> | <u>0.0006</u> |
| Mean Aerodynamic Chord, In. | <u>73.2</u> | <u>0.732</u> |

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Table III (Cont'd)

MODEL COMPONENT : EXTERNAL TANK - T₁₀

GENERAL DESCRIPTION : External oxygen-hydrogen tank, configuration 3

MODEL SCALE: 0.010

DRAWING NUMBER : VL72-000088, VL78-000041

| DIMENSIONS : | FULL SCALE | MODEL SCALE |
|--|----------------|---------------|
| Length (Nose at $X_T = 309$) | <u>1865.0</u> | <u>18.650</u> |
| Max Width (Dia.), In. | <u>324.00</u> | <u>3.240</u> |
| Max Depth | <u></u> | <u></u> |
| Fineness Ratio | <u>5.756</u> | <u>5.756</u> |
| Area - Ft ² | <u></u> | <u></u> |
| Max. Cross-Sectional | <u>572.555</u> | <u>0.057</u> |
| Planform | <u></u> | <u></u> |
| Wetted | <u></u> | <u></u> |
| Base | <u></u> | <u></u> |
| W.P. of Tank Centerline (X_T), In. | <u>400.0</u> | <u>4.00</u> |

Table III (Cont'd)

MODEL COMPONENT : EXTERNAL TANK - T₁₆

GENERAL DESCRIPTION : External oxygen-hydrogen tank. Has a 2416-
inch radius secant ogive nose.

MODEL SCALE: 0.010

DRAWING NUMBER : SS-A01167

| DIMENSIONS : | FULL SCALE | MODEL SCALE |
|--|-------------------|-------------------|
| Length, In. (Nose At $X_T = 276$) | <u>1898.0</u> | <u>18.980</u> |
| Max Width | <u>324.0</u> | <u>3.240</u> |
| Max Depth | <u> </u> | <u> </u> |
| Fineness Ratio | <u>5.858</u> | <u>5.858</u> |
| Area - Ft ² | <u> </u> | <u> </u> |
| Max. Cross-Sectional | <u>572.555</u> | <u>0.057</u> |
| Planform | <u> </u> | <u> </u> |
| Wetted | <u> </u> | <u> </u> |
| Base | <u> </u> | <u> </u> |
| W.P. of tank centerline (Z_T), In. | <u>400.0</u> | <u>4.00</u> |
| L.E. nose radius | <u>16.5</u> | <u>0.165</u> |
| Origin of 2416" radius at 2231 from tank centerline | <u>1181.0</u> | <u>11.810</u> |

Table III (Cont'd)

MODEL COMPONENT: VERTICAL - V 7GENERAL DESCRIPTION: Centerline vertical tail, doublewedge airfoil with rounded leading edge.NOTE: Same as V₅, but with manipulator housing removed.MODEL SCALE: 0.010DRAWING NUMBER: VL70-000139

| DIMENSIONS: | FULL SCALE | MODEL SCALE |
|-------------------------------|------------|-------------|
| TOTAL DATA | | |
| Area (Theo) - Ft ² | | |
| Planform | 425.92 | 0.043 |
| Span (Theo) - In. | 315.72 | 3.157 |
| Aspect Ratio | 1.675 | 1.675 |
| Rate of Taper | 0.507 | 0.507 |
| Taper Ratio | 0.404 | 0.404 |
| Sweep-Back Angles, Degrees. | | |
| Leading Edge | 45.000 | 45.000 |
| Trailing Edge | 26.249 | 26.249 |
| 0.25 Element Line | 41.130 | 41.130 |
| Chords: | | |
| Root (Theo) WP | 268.50 | 2.685 |
| Tip (Theo) WP | 108.47 | 1.085 |
| MAC | 199.81 | 1.998 |
| Fus. Sta. of .25 MAC | 1463.50 | 14.635 |
| W.P. of .25 MAC | 635.522 | 6.355 |
| B.L. of .25 MAC | 0.00 | 0.00 |
| Airfoil Section | | |
| Leading Wedge Angle - Deg. | 10.00 | 10.00 |
| Trailing Wedge Angle - Deg. | 14.920 | 14.920 |
| Leading Edge Radius | 2.00 | 0.020 |
| Void Area | 13.17 | 0.0013 |
| Blanketed Area | 0.0 | 0.0 |

Table III (Conl'd)

MODEL COMPONENT: WING-W₁₀₃

GENERAL DESCRIPTION: Configuration 3 orbiter wing.

NOTE: Same planform as W₈₇, except dihedral at trailing edge.

MODEL SCALE: 0.010

| | | |
|---|------------|-------------|
| TEST NO. | DWG. NO. | VL70-000139 |
| DIMENSIONS: | FULL-SCALE | MODEL SCALE |
| TOTAL DATA | | |
| Area (Theo.) Ft ² | 2690.00 | 0.2690 |
| Planform | 936.68 | 9.367 |
| Span (Theo) In. | 2.265 | 2.265 |
| Aspect Ratio | 1.177 | 1.177 |
| Rate of Taper | 0.200 | 0.200 |
| Taper Ratio | 3.500 | 3.500 |
| Dihedral Angle, degrees | 3.000 | 3.000 |
| Incidence Angle, degrees | 3.000 | 3.000 |
| Aerodynamic Twist, degrees | | |
| Sweep Back Angles, degrees | 45.000 | 45.000 |
| Leading Edge | - 10.24 | -10.24 |
| Trailing Edge | 35.209 | 35.209 |
| 0.25 Element Line | | |
| Chords: | | |
| Root (Theo) B.P.O.O. | 689.24 | 6.892 |
| Tip, (Theo) B.P. | 137.85 | 1.379 |
| MAC | 474.81 | 4.748 |
| Fus. Sta. of .25 MAC | 1136.89 | 11.369 |
| W.P. of .25 MAC | 299.20 | 2.992 |
| B.L. of .25 MAC | 182.13 | 1.821 |
| EXPOSED DATA | | |
| Area (Theo) Ft ² | 1752.29 | 0.175 |
| Span, (Theo) In. BP108 | 720.68 | 7.207 |
| Aspect Ratio | 2.058 | 2.058 |
| Taper Ratio | 0.245 | 0.245 |
| Chords | | |
| Root BP108 | 562.40 | 5.624 |
| Tip 1.00 $\frac{b}{2}$ | 137.85 | 1.379 |
| MAC | 393.03 | 3.930 |
| Fus. Sta. of .25 MAC | 1185.31 | 11.853 |
| W.P. of .25 MAC | 300.20 | 3.002 |
| B.L. of .25 MAC | 251.76 | 2.518 |
| Airfoil Section (Rockwell Mod NASA) | | |
| XXXX-64 | | |
| Root $\frac{b}{2}$ = | 0.10 | 0.10 |
| Tip $\frac{b}{2}$ = | 0.12 | 0.12 |
| Data for (1) of (2) Sides | | |
| Leading Edge Cuff | | |
| Planform Area Ft ² | 120.33 | 0.012 |
| Leading Edge Intersects Fus M. L. @ Sta | 560.0 | 5.600 |
| Leading Edge Intersects Wing @ Sta | 1035.0 | 10.350 |

Table IV.
HEAT TRANSFER GAGE LOCATIONS
ORBITER ($L_{oms} = 12.903$)

FUSELAGE

| GAGE NO. | X_m/L_{oms} | X_{oms} (FROM NOSE) | ACTUAL x_{oms} | DESIRED Y_{oms} | ACTUAL Y_{oms} | ϕ |
|----------|---------------|--------------------------|---------------------|----------------------|---------------------|--------|
| 1 | 0 | 0 | 0 | 0 | +0.12 | 0 |
| 2 | 0.005 | .065 | .086 | | .012 | |
| 3 | 0.02 | .258 | .249 | | .012 | |
| 4 | 0.04 | .516 | .539 | | .020 | |
| 5 | 0.06 | .774 | .797 | | .017 | |
| 6 | 0.08 | 1.032 | 1.051 | | .019 | |
| 7 | 0.10 | 1.290 | 1.324 | | .019 | |
| 8 | 0.12 | 1.548 | 1.570 | | .019 | |
| 9 | 0.14 | 1.806 | 1.831 | | .018 | |
| 10 | 0.16 | 2.065 | 2.078 | | .016 | |
| 11 | 0.20 | 2.580 | 2.578 | | .009 | |
| 12 | 0.25 | 3.226 | 3.221 | | .008 | |
| 13 | 0.30 | 3.871 | 3.873 | | .005 | |
| 14 | 0.35 | 4.516 | 4.520 | | .006 | |
| 15 | 0.40 | 5.161 | 5.172 | | .006 | |
| 16 | 0.45 | 5.806 | 5.795 | | .005 | |
| 17 | 0.50 | 6.452 | 6.452 | | .005 | |
| 18 | 0.60 | 7.742 | 7.698 | | .003 | |
| 19 | 0.70 | 9.032 | 9.033 | | .006 | |
| 20 | 0.80 | 10.322 | 10.320 | | .004 | |
| 21 | 0.90 | 11.613 | 11.616 | | .011 | |
| 22 | 1.00 | 12.903 | 12.907 | | .010 | |
| 23 | 0.03 | .387 | .391 | | .016 | 180° |
| 24 | 0.06 | .774 | .780 | | .014 | |
| 25 | 0.09 | 1.161 | 1.171 | | .004 | |
| 26 | 0.125 | 1.613 | 1.623 | | .006 | |
| 27 | 0.15 | 1.935 | 1.940 | | .006 | |
| 28 | 0.130 | 2.323 | 2.333 | | .007 | |
| 29 | 0.160 | 2.065 | 2.067 | | .009 | |
| 30 | 0.170 | 2.194 | 2.200 | | .009 | |
| 31 | 0.50 | 6.452 | 6.461 | | .003 | |
| 32 | 0.70 | 9.032 | 9.023 | | .001 | 180° |
| 33 | 0.10 | 1.290 | 1.284 | | .569 | 30° |
| 34 | 0.20 | 2.580 | 2.593 | | .638 | 30° |
| 35 | 0.30 | 3.871 | 3.875 | 500 | .490 | --- |
| 36 | 0.40 | 5.161 | 5.151 | 500 | .494 | --- |
| 37 | 0.60 | 7.742 | 7.749 | 500 | .494 | --- |
| 38 | 0.80 | 10.322 | 10.323 | 500 | .497 | --- |

WING LOWER SURFACE

| GAGE NO. | DESIRED X_{oms} (FROM NOSE) | ACTUAL x_{oms} | DESIRED Y_{oms} | ACTUAL Y_{oms} |
|----------|-------------------------------------|---------------------|----------------------|---------------------|
| 43 | 5.161 | 5.165 | 1.171 | 1.159 |
| 44 | 6.451 | 6.442 | | 1.156 |
| 45 | 7.742 | 7.750 | | 1.161 |
| 46 | 9.032 | 9.040 | | 1.166 |
| 47 | 11.613 | 11.615 | 1.171 | 1.163 |
| 48 | 7.742 | 7.780 | 1.873 | 1.930 |
| 49 | 9.032 | 9.029 | | 1.867 |
| 50 | 10.322 | 10.322 | | 1.871 |
| 51 | 12.037 | 12.035 | 1.873 | 1.867 |
| 52 | 8.399 | 8.407 | 2.342 | 2.337 |
| 53 | 9.032 | 9.044 | | 2.332 |
| 54 | 10.322 | 10.326 | | 2.338 |
| 55 | 11.211 | 11.219 | 2.342 | 2.341 |
| 56 | 9.500 | 9.499 | 2.810 | 2.804 |
| 57 | 10.322 | 10.322 | | 2.804 |
| 58 | 10.940 | 10.941 | 2.810 | 2.811 |
| 59 | 12.020 | 12.018 | 2.810 | 2.804 |
| 60 | 9.554 | 9.653 | 3.513 | 3.455 |
| 61 | 10.322 | 10.321 | 3.513 | 3.510 |
| 62 | 11.424 | 11.429 | 3.513 | 3.507 |
| 63 | 10.172 | 10.145 | 3.981 | 3.972 |
| 64 | 11.060 | 11.066 | 3.981 | 3.967 |
| 65 | 8.520 | 8.503 | 1.373 | 1.854 |
| 66 | 10.658 | 10.666 | 4.449 | 4.436 |
| 67 | 11.293 | 11.293 | 4.449 | 4.448 |
| 68 | 11.345 | 11.347 | TIP | TIP |

WING LEADING EDGE

| GAGE NO. | LOCATION | | X_{ACTUAL} |
|----------|---------------|---------------|--------------|
| | DESIRED | ACTUAL | |
| 69-70 | $Y_o = 1.171$ | $Y_o = 1.155$ | |
| 71-72 | $X = 5.160$ | $X = 5.164$ | |
| 73-74 | $X = 6.503$ | $X = 6.508$ | |
| 75-76 | $X = 7.742$ | $X = 7.753$ | |
| 77-78 | $Y_o = 2.342$ | $Y = 2.351$ | 8.332 |
| 79-86* | $Y_o = 2.810$ | $Y = 2.823$ | 8.801 |
| 89-90 | $Y_o = 3.513$ | $Y = 3.517$ | 9.487 |
| 91-98* | $Y_o = 3.981$ | $Y = 4.033$ | 10.016 |
| 101-102 | $Y_o = 4.449$ | $Y = 4.466$ | 10.577 |

*GAGE NUMBERS 87, 88 & 99, 100 WERE NOT FABRICATED BECAUSE OF SPACE LIMITATIONS.

VERTICAL TAIL

| GAGE NO. | DESIRED Z_{oms} | ACTUAL z_{oms} |
|----------|----------------------|---------------------|
| 39 | 6.096 | 6.091 |
| 40 | 6.961 | 6.970 |
| 41 | 7.867 | 7.861 |
| 42 | 8.157 | 8.156 |

Table IV. (Conl'd)
TANK ($L_{tms} = 18.650$)

| GAGE NO. | X_{ms}/L_{tms} | X_{ms} (FROM NOSE) | ACTUAL x | ϕ |
|----------|------------------|-------------------------|-------------|--------|
| 103 | 0.00 | 0 | 0 | — |
| 104 | .005 | .080 | .076 | 220 |
| 105 | .01 | .186 | .196 | 199 |
| 106 | .04 | .746 | .760 | 180 |
| 107 | .08 | 1.492 | 1.498 | ↑ |
| 108 | .15 | 2.798 | 2.802 | ↓ |
| 109 | .20 | 3.730 | 3.744 | 180 |
| 110 | .21 | 3.917 | 3.932 | 0 |
| 111 | .04 | .746 | .740 | 180 |
| 112 | .25 | 4.663 | 4.686 | ↑ |
| 113 | .35 | 6.528 | 6.545 | ↓ |
| 114 | .375 | 6.994 | 7.009 | 180 |
| 115 | .40 | 7.460 | 7.478 | ↑ |
| 116 | .425 | 7.926 | 7.953 | ↓ |
| 117 | .45 | 8.393 | 8.414 | 180 |
| 118 | .475 | 8.859 | 8.877 | ↑ |
| 119 | .50 | 9.325 | 9.341 | ↓ |
| 120 | .343 | 6.397 | 6.407 | 225 |
| 121 | .55 | 10.258 | 10.271 | 180 |
| 122 | .475 | 7.572 | 7.590 | 193 |
| 123 | .60 | 11.190 | 11.215 | 180 |
| 124 | .65 | 12.123 | 12.145 | ↑ |
| 125 | .70 | 13.055 | 13.083 | ↓ |
| 126 | .80 | 14.920 | 14.940 | 180 |
| 127 | .90 | 16.785 | 16.818 | ↑ |
| 128 | .937 | 17.475 | 17.458 | ↓ |
| 129 | .406 | 7.572 | 7.594 | 167 |
| 130 | .15 | 2.798 | 2.800 | 0 |
| 131 | .44 | 8.206 | 8.223 | 199 |
| 132 | .08 | 1.492 | 1.492 | 0 |
| 133 | .475 | 8.859 | 8.871 | 199 |
| 134 | .50 | 9.325 | 9.335 | 199 |
| 135 | .90 | 16.785 | 16.796 | 199 |
| 136 | .40 | 7.460 | 7.464 | 221.5 |
| 137 | .50 | 9.325 | 9.344 | ↑ |
| 138 | .60 | 11.190 | 11.205 | ↓ |
| 139 | .70 | 13.055 | 13.073 | 221.5 |
| 140 | .80 | 14.920 | 14.940 | ↑ |
| 141 | .85 | 15.853 | 15.882 | ↓ |
| 142 | .90 | 16.785 | 16.818 | 214. |
| 143 | .825 | 15.386 | 15.386 | ↑ |
| 144 | .85 | 15.853 | 15.874 | ↓ |
| 145 | .875 | 16.319 | 16.339 | 241. |
| 146 | .90 | 16.785 | 16.805 | ↑ |
| 147 | .925 | 17.251 | 17.280 | ↓ |
| 148 | .960 | 17.904 | 17.902 | 247.5 |
| 149 | .85 | 15.853 | 15.874 | ↑ |
| 150 | .90 | 16.785 | 16.795 | ↓ |
| 151 | .20 | 3.730 | 3.729 | 270. |
| 152 | .40 | 7.460 | 7.465 | ↑ |
| 153 | .50 | 9.325 | 9.322 | ↓ |
| 154 | .60 | 11.190 | 11.200 | 270. |
| 155 | .70 | 13.055 | 13.066 | ↑ |
| 156 | .80 | 14.920 | 14.930 | ↓ |
| 157 | .90 | 16.785 | 16.810 | 315 |
| 158 | .60 | 11.190 | 11.196 | ↑ |
| 159 | .80 | 14.920 | 14.930 | ↓ |
| 160 | .40 | 7.460 | 7.459 | 0 |
| 161 | .60 | 11.190 | 11.191 | 0 |
| 162 | .80 | 14.920 | 14.914 | 0 |

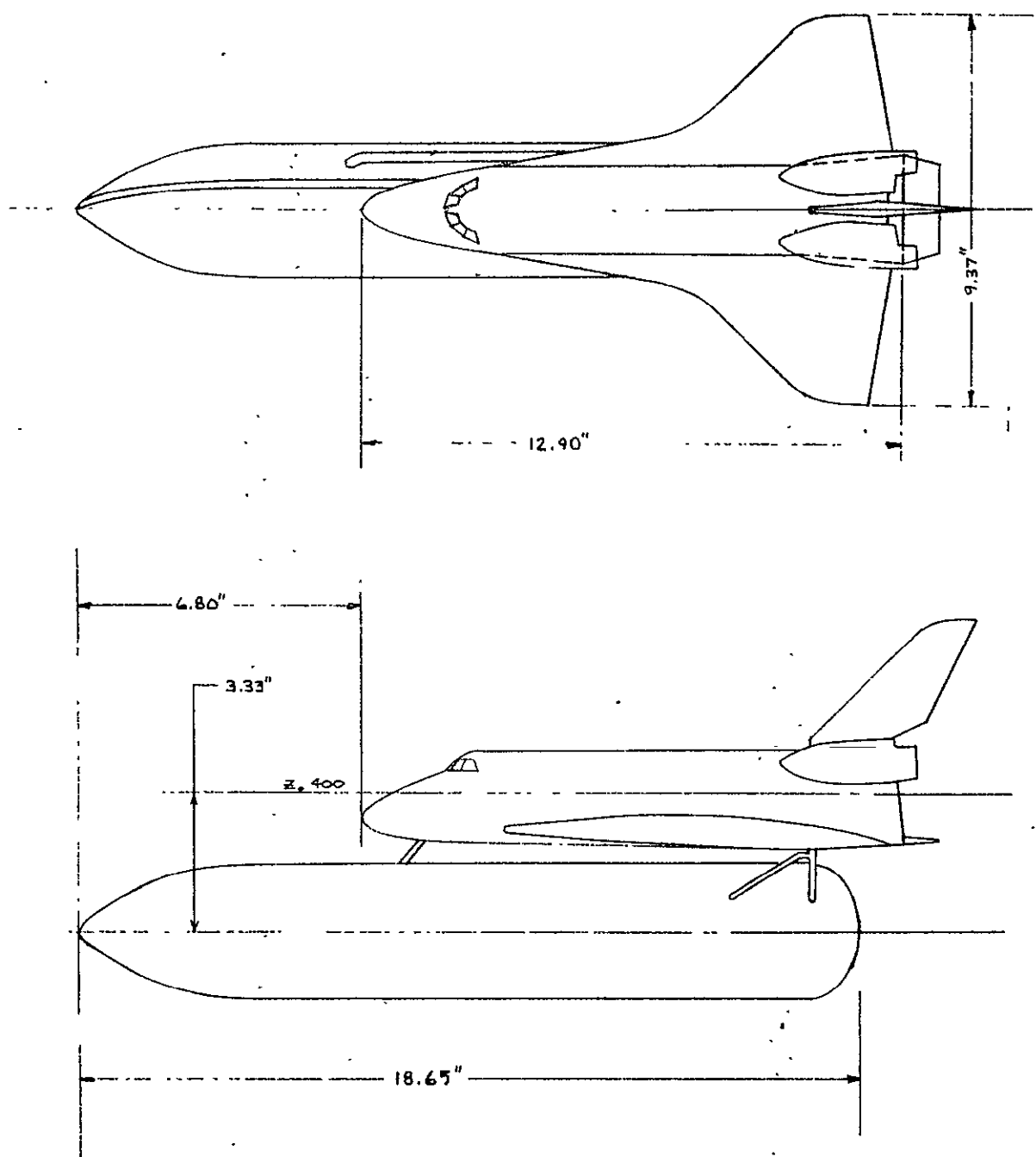
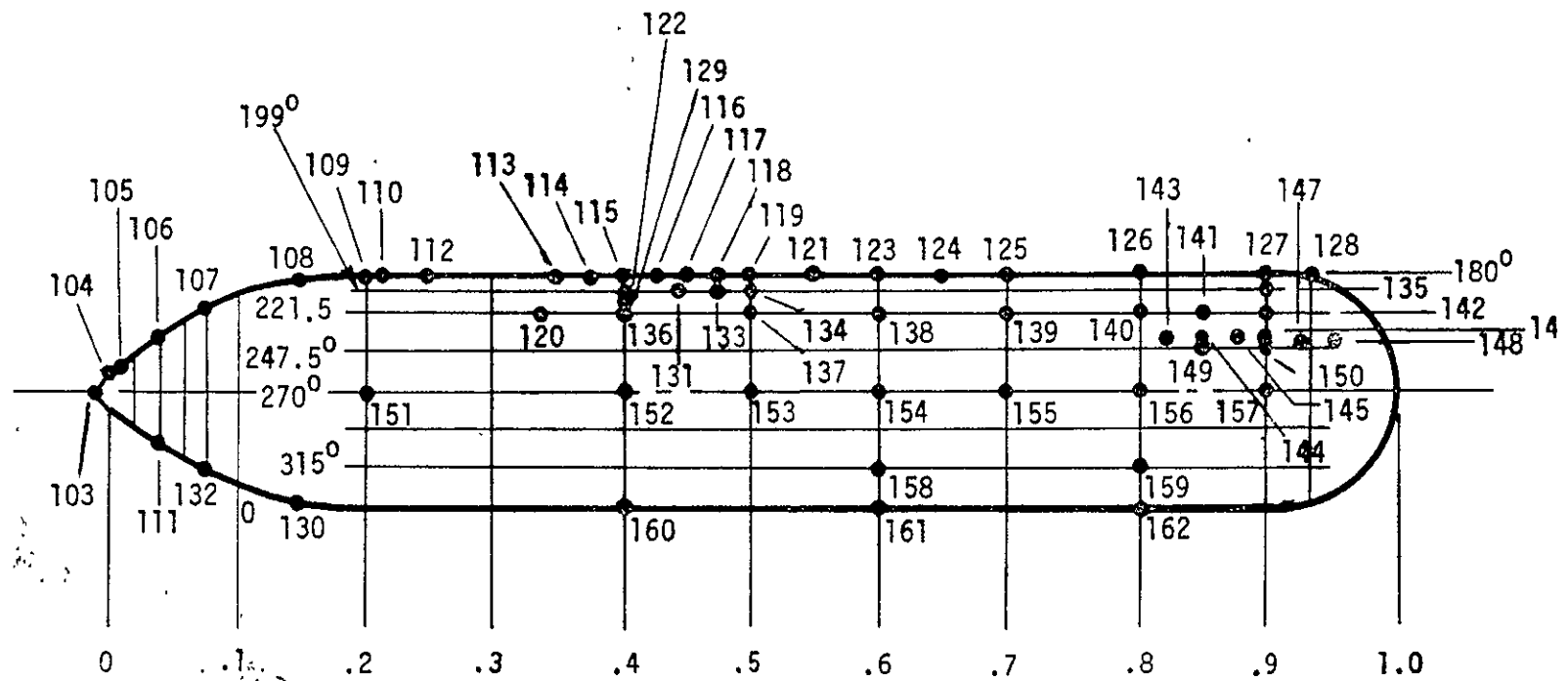
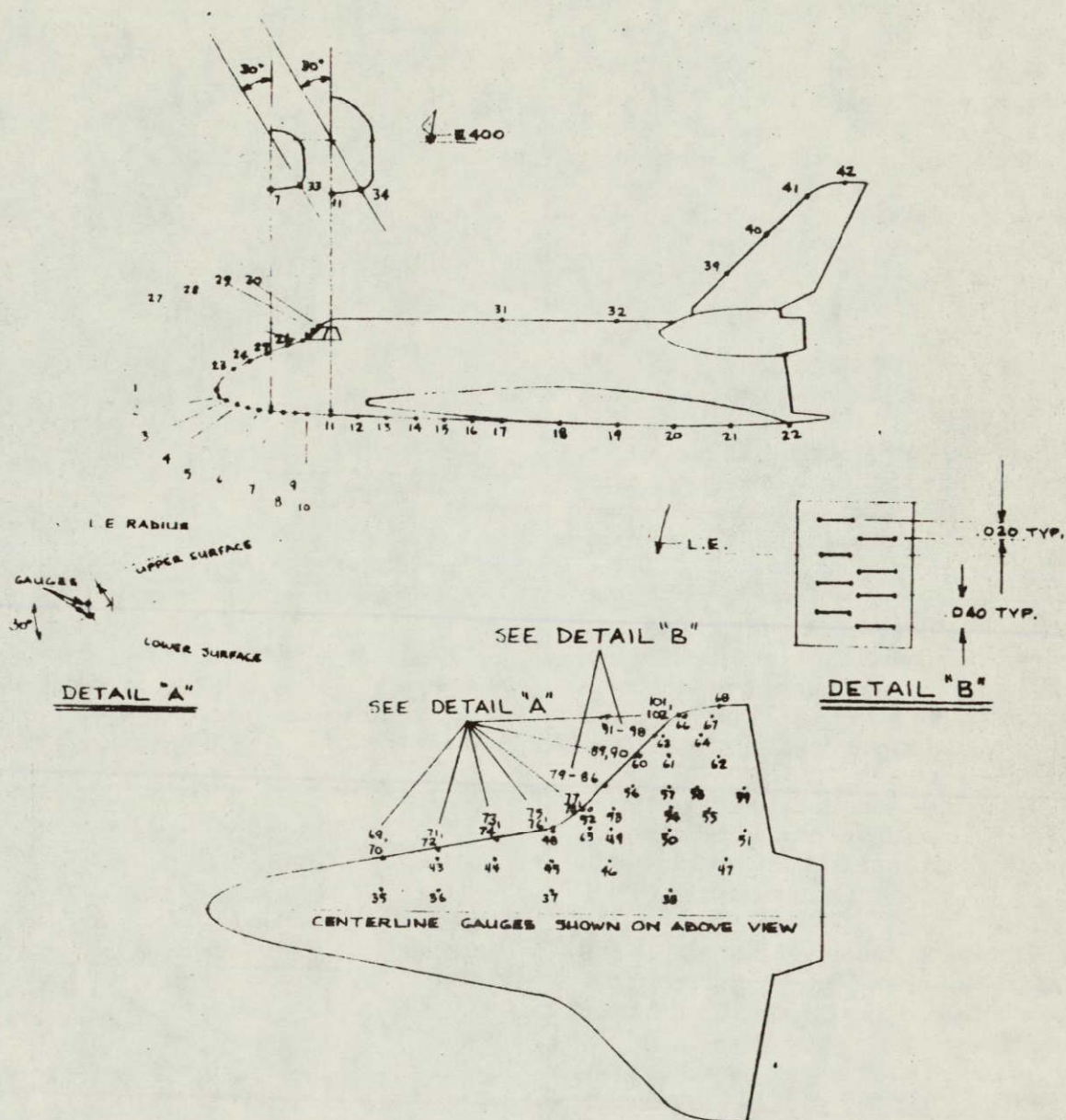


Figure 1. Configuration 3 Orbiter/ET



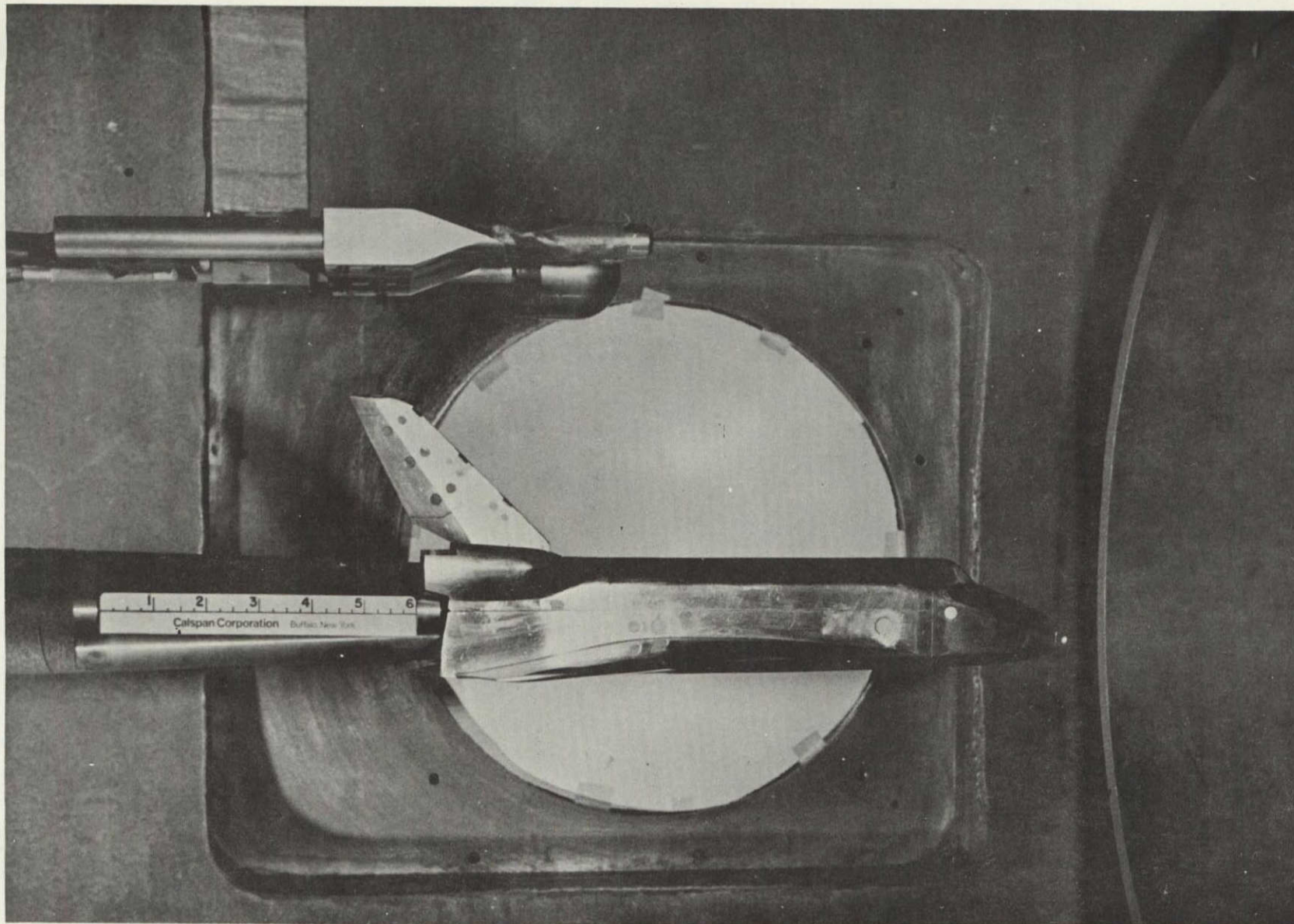
a. Model 37-T. Instrumentation Locations

Figure 2. - Model instrumentation.



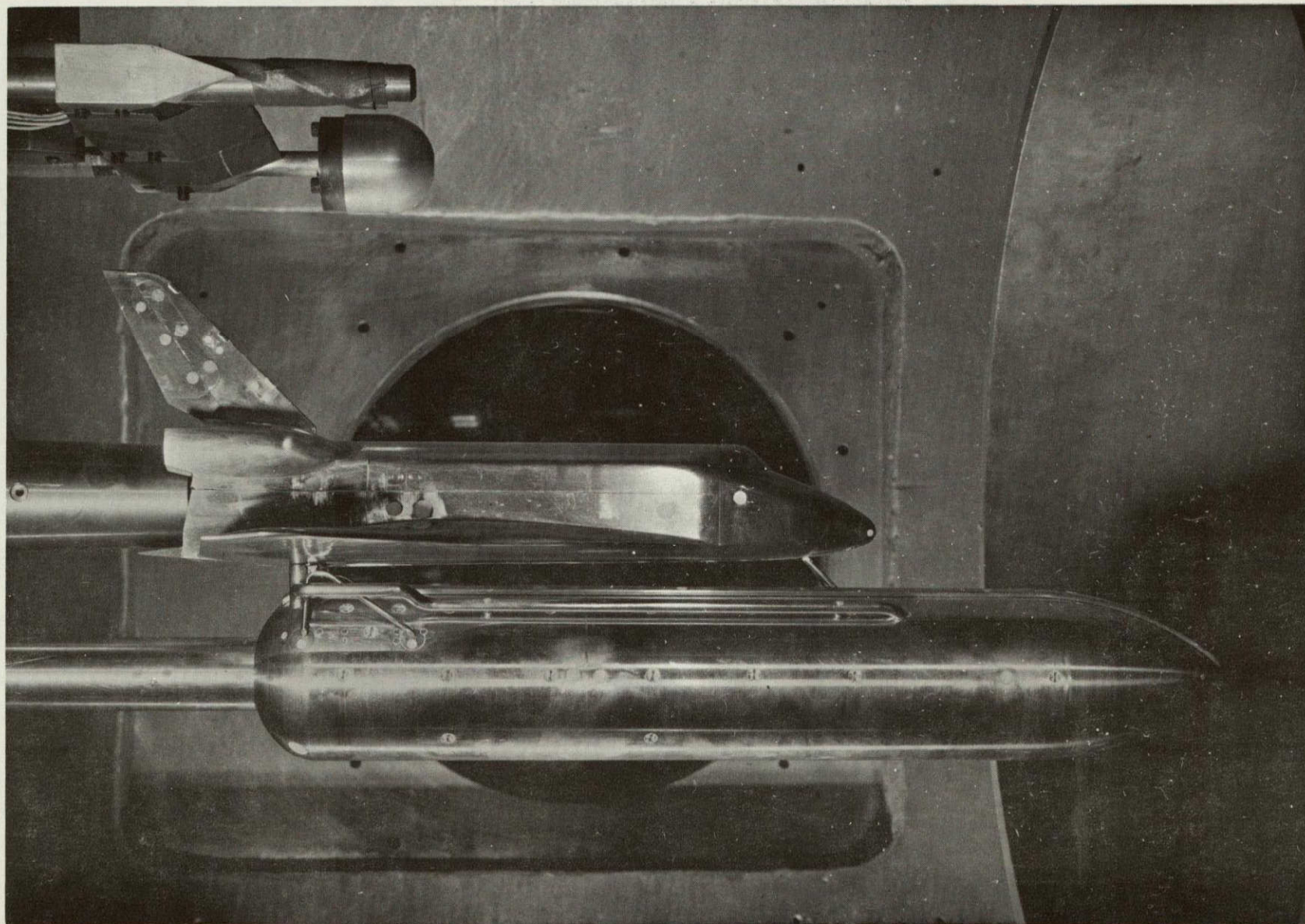
b. 37-0 Instrumentation Locations

Figure 2. - Concluded.



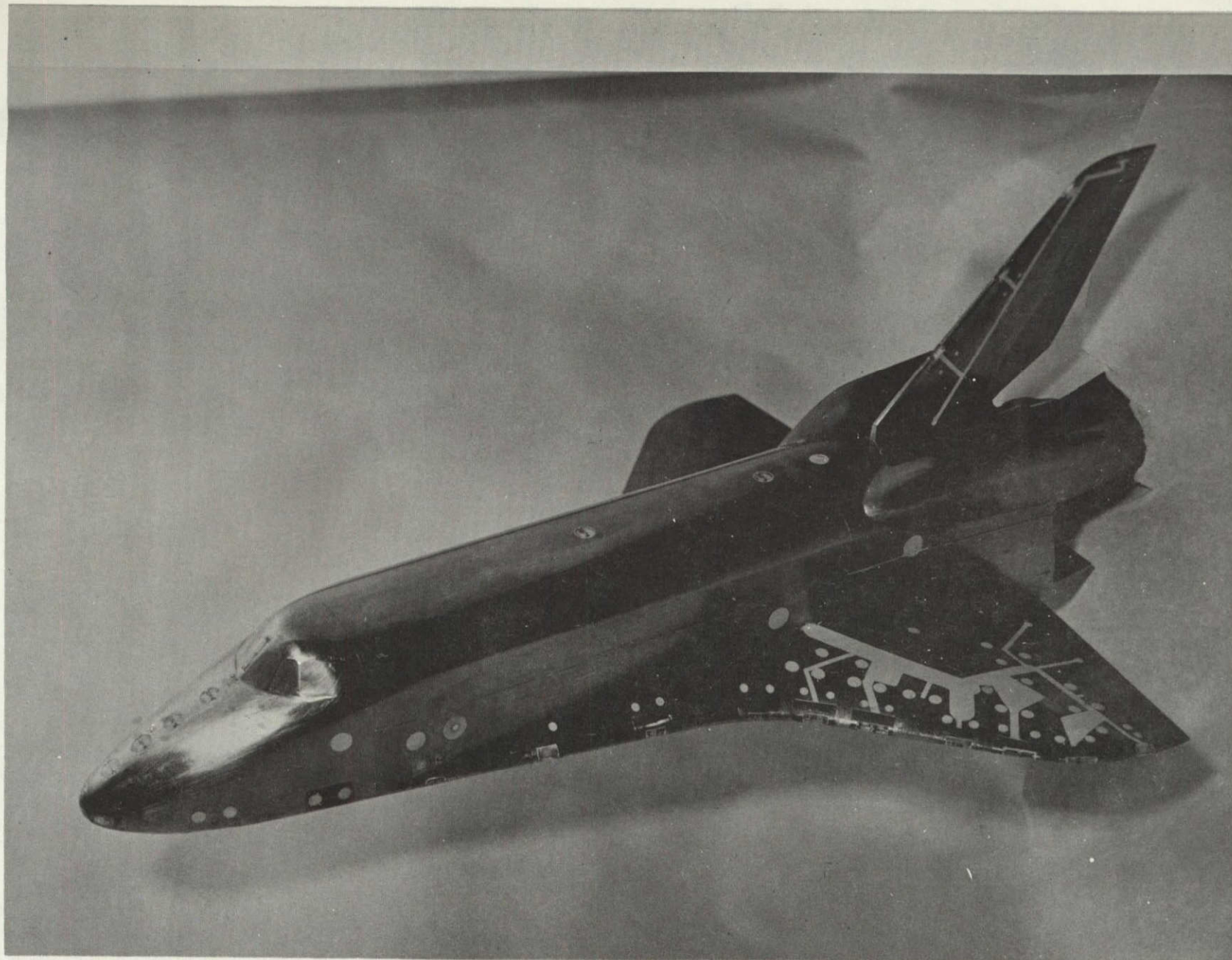
a. Installation of model 37-0 - Orbiter Alone

Figure 3.- Model photographs.



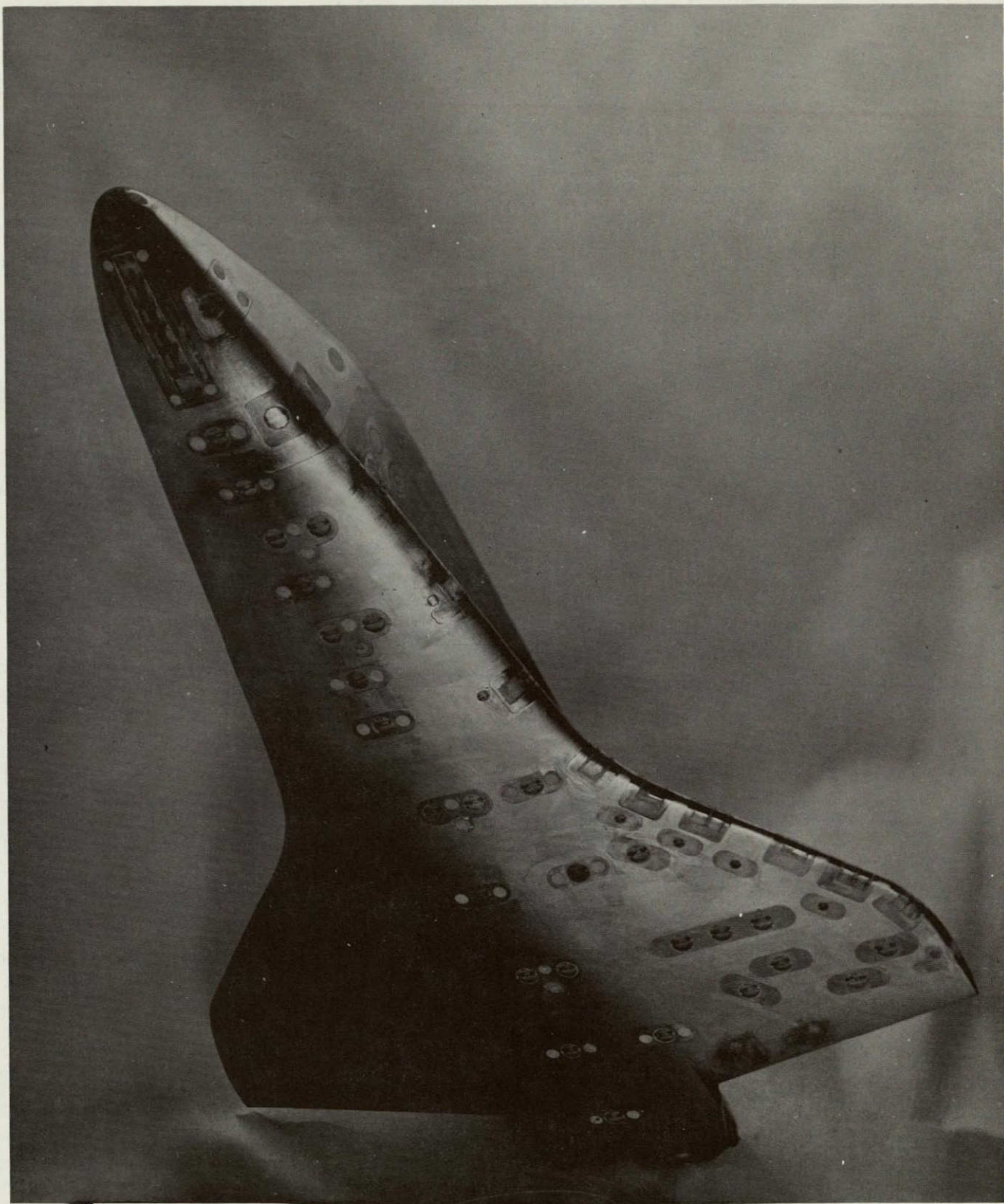
b. Installation of Model 37-OT - Orbiter/Tank

Figure 3. - Continued.



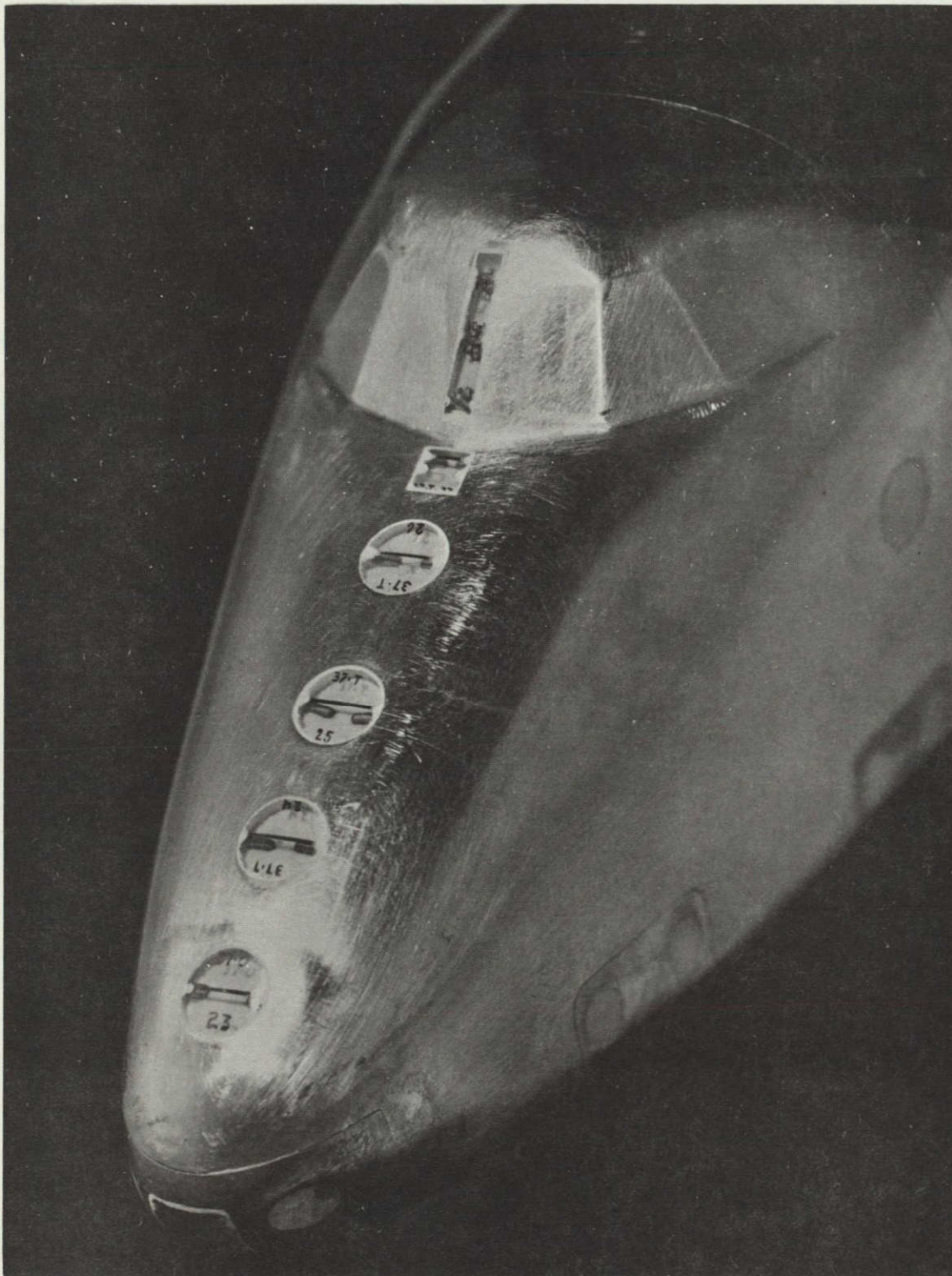
c. Instrumentation - Orbiter Top View

Figure 3. - Continued.



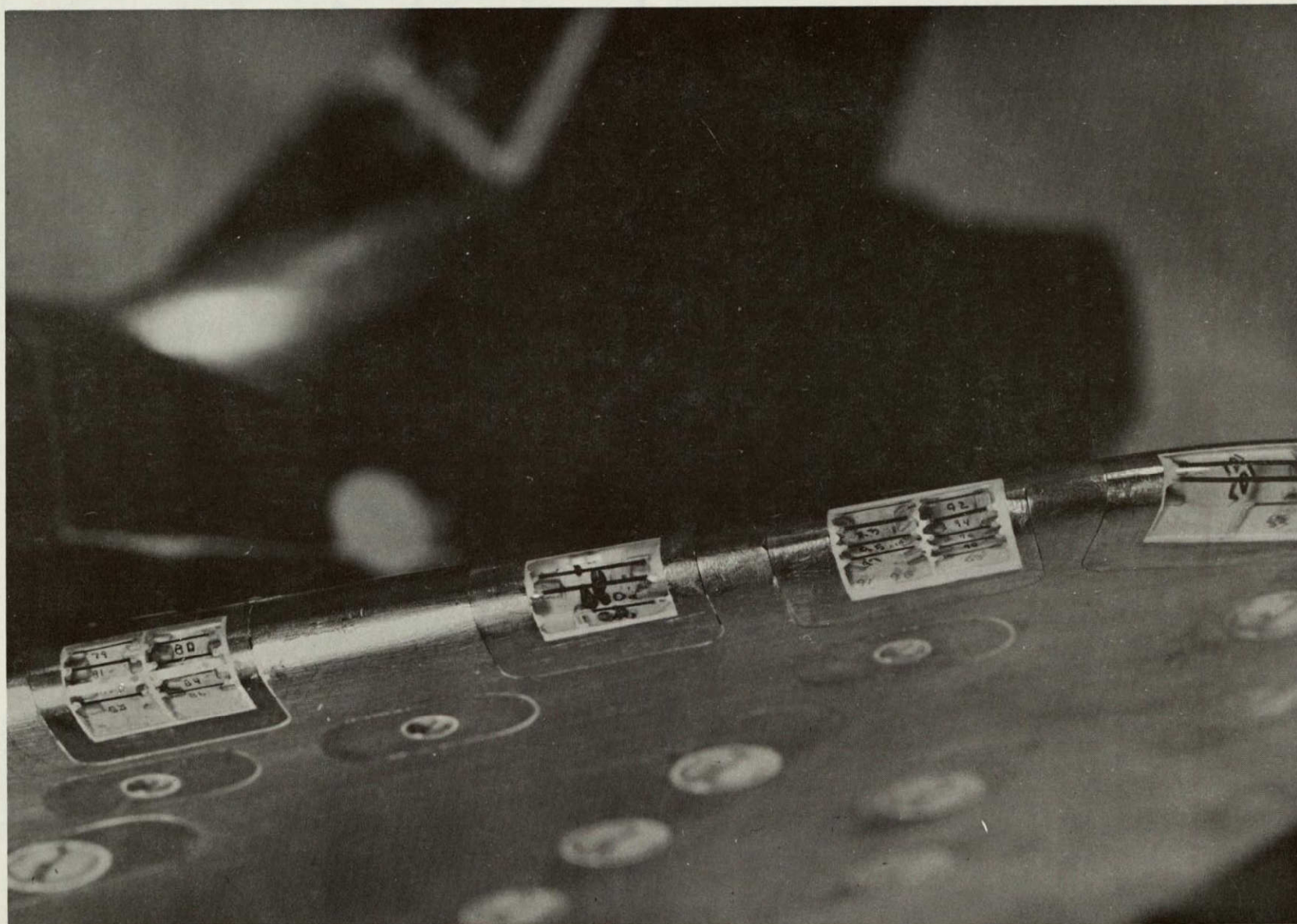
d. Instrumentation - Orbiter Bottom Surface

Figure 3. - Continued.



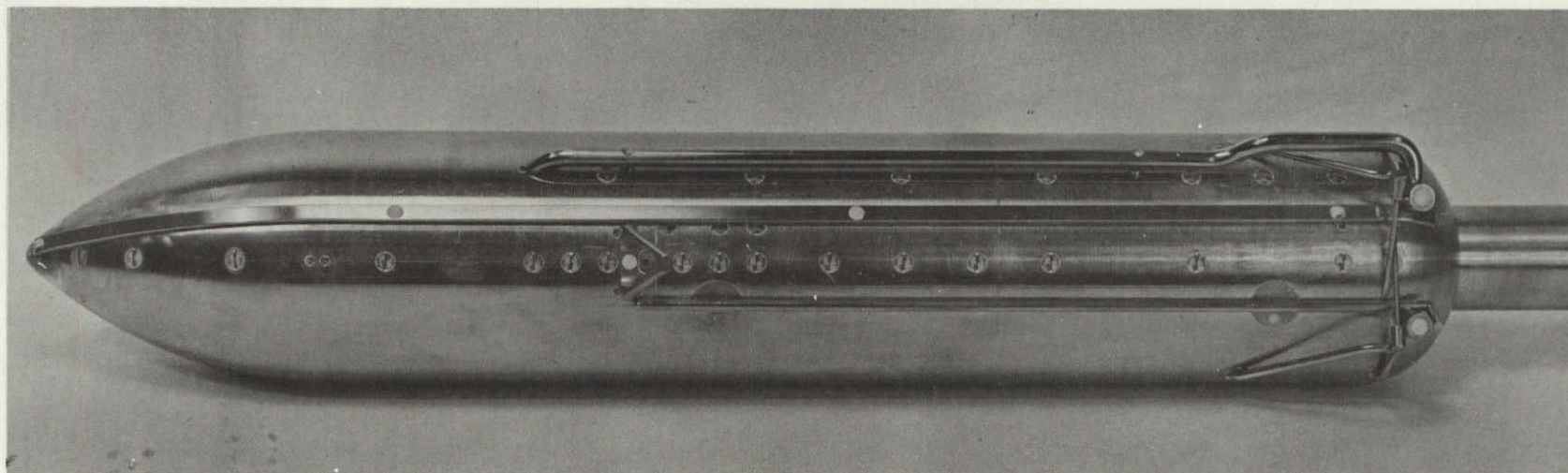
e. Instrumentation - Orbiter Nose and Canopy

Figure 3. - Continued.



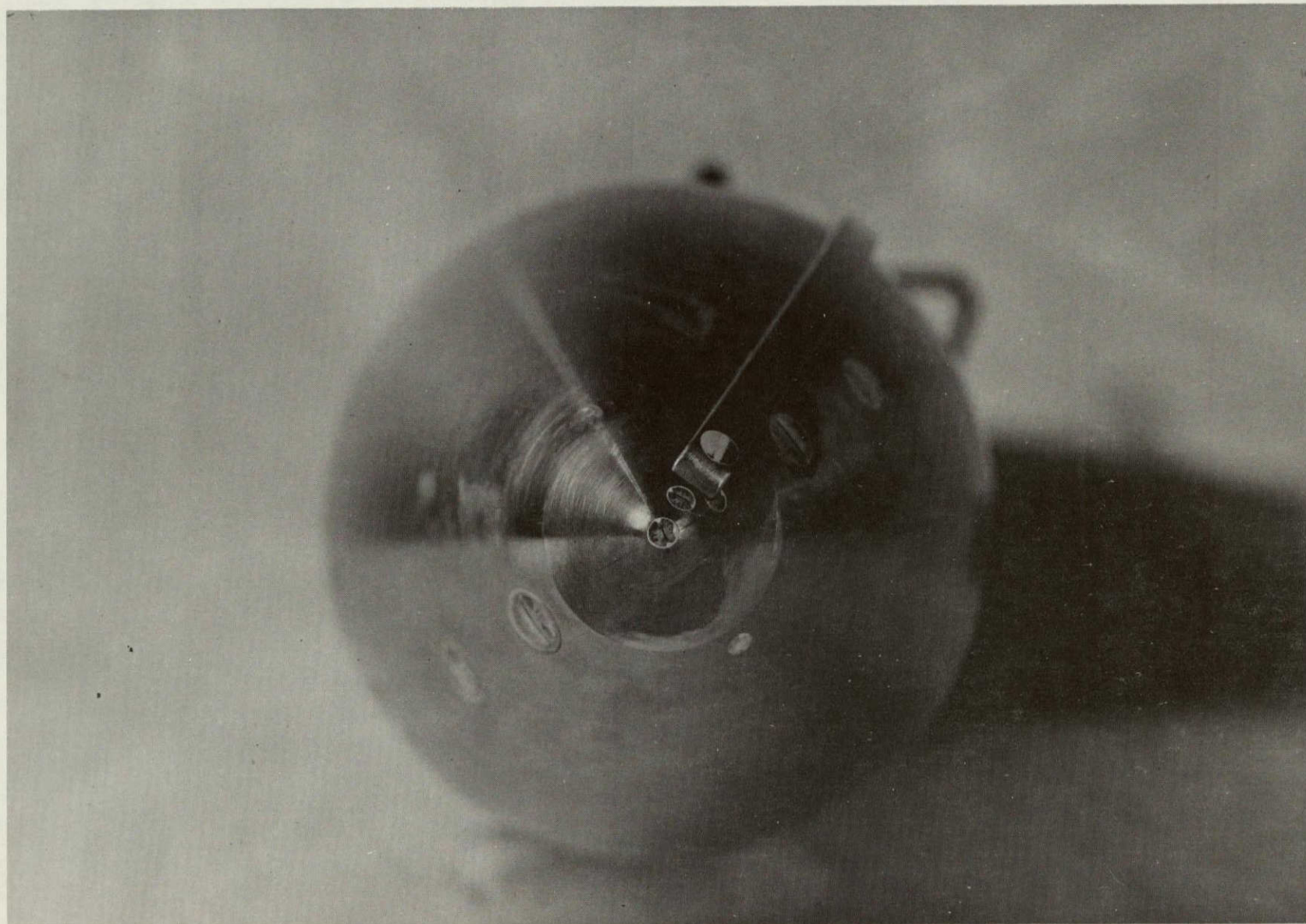
f. Instrumentation - Orbiter Wing Leading Edge

Figure 3. - Continued.



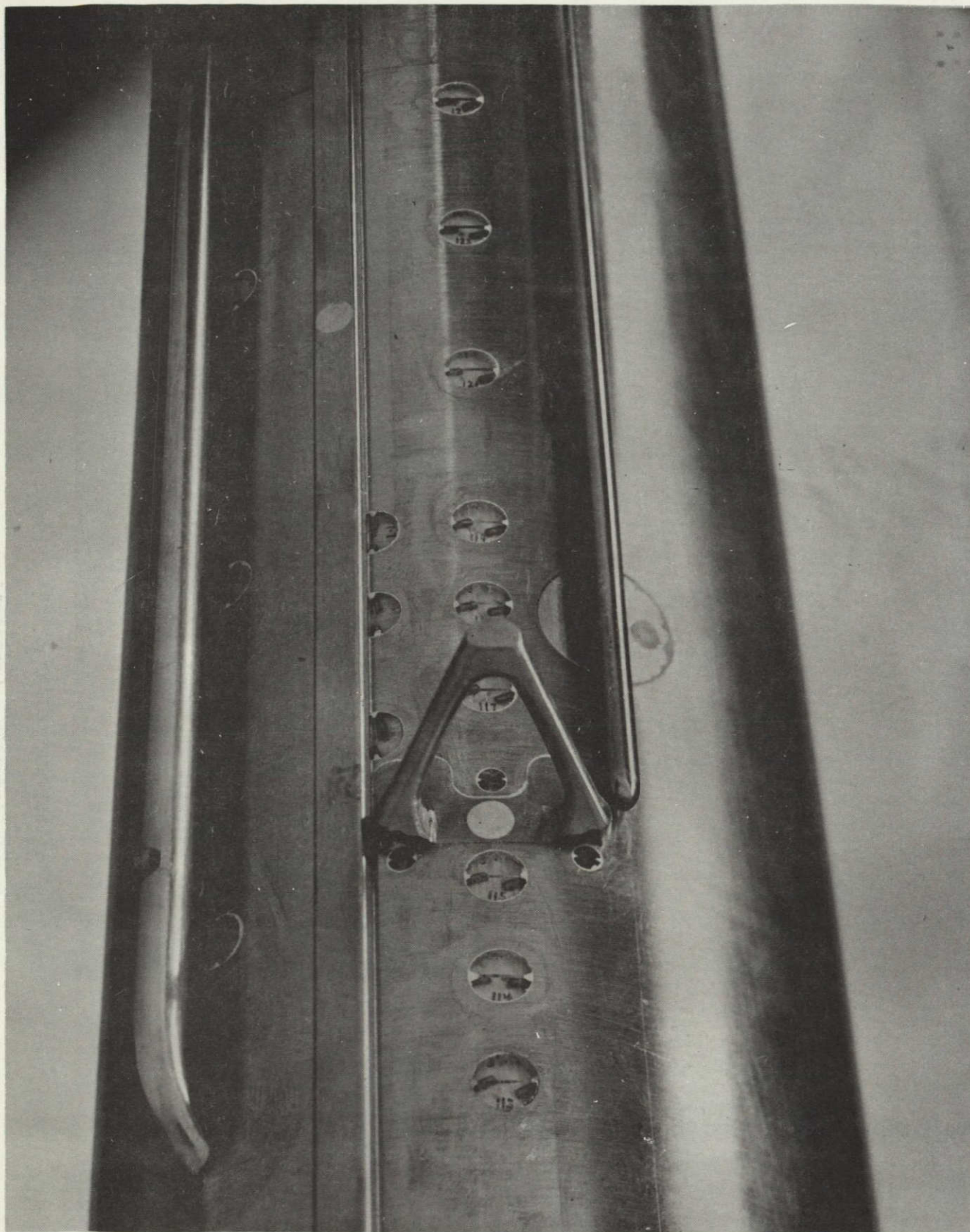
g. Instrumentation - Tank Top View

Figure 3. - Continued.

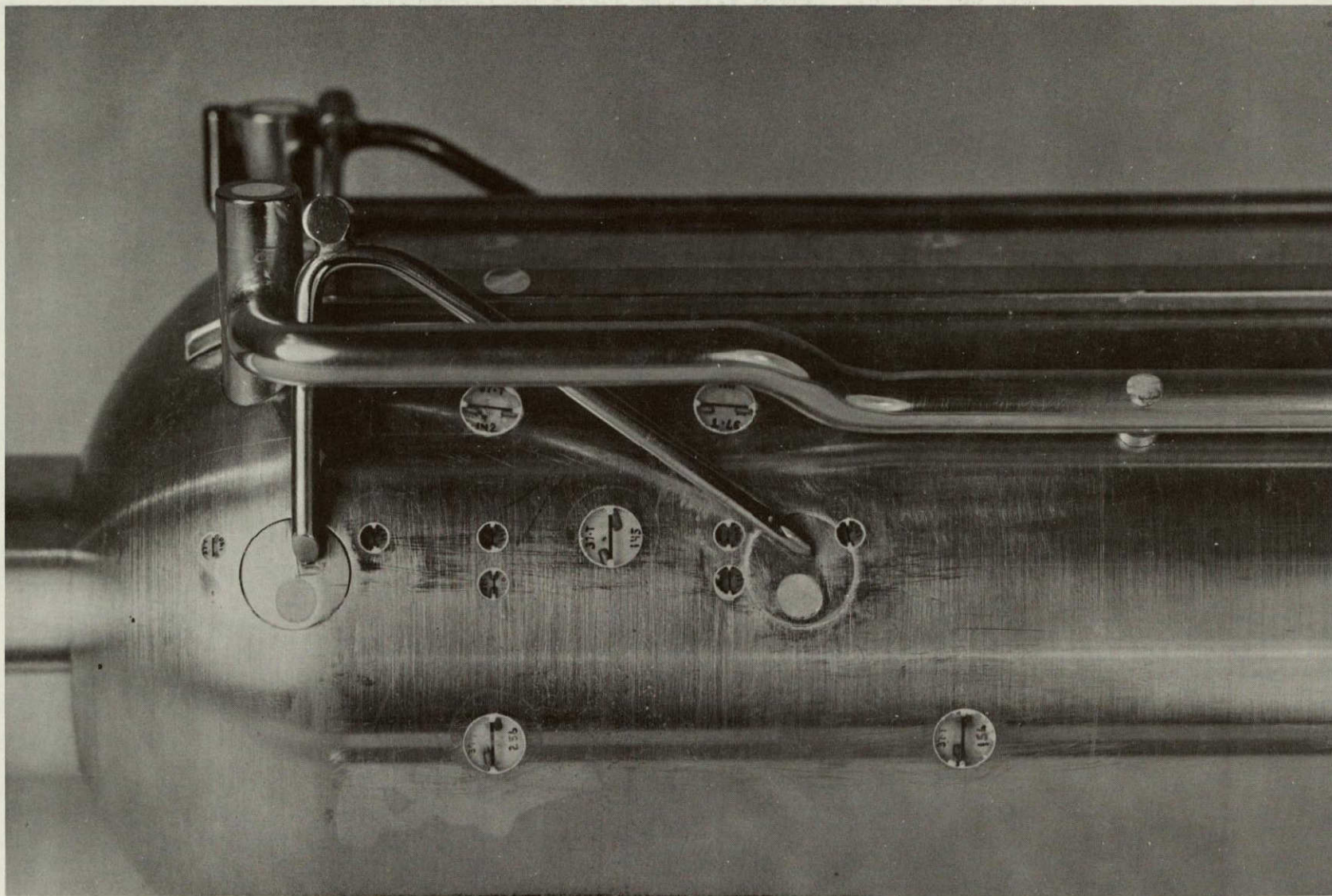


h. Instrumentation - Tank Nose

Figure 3. - Continued.

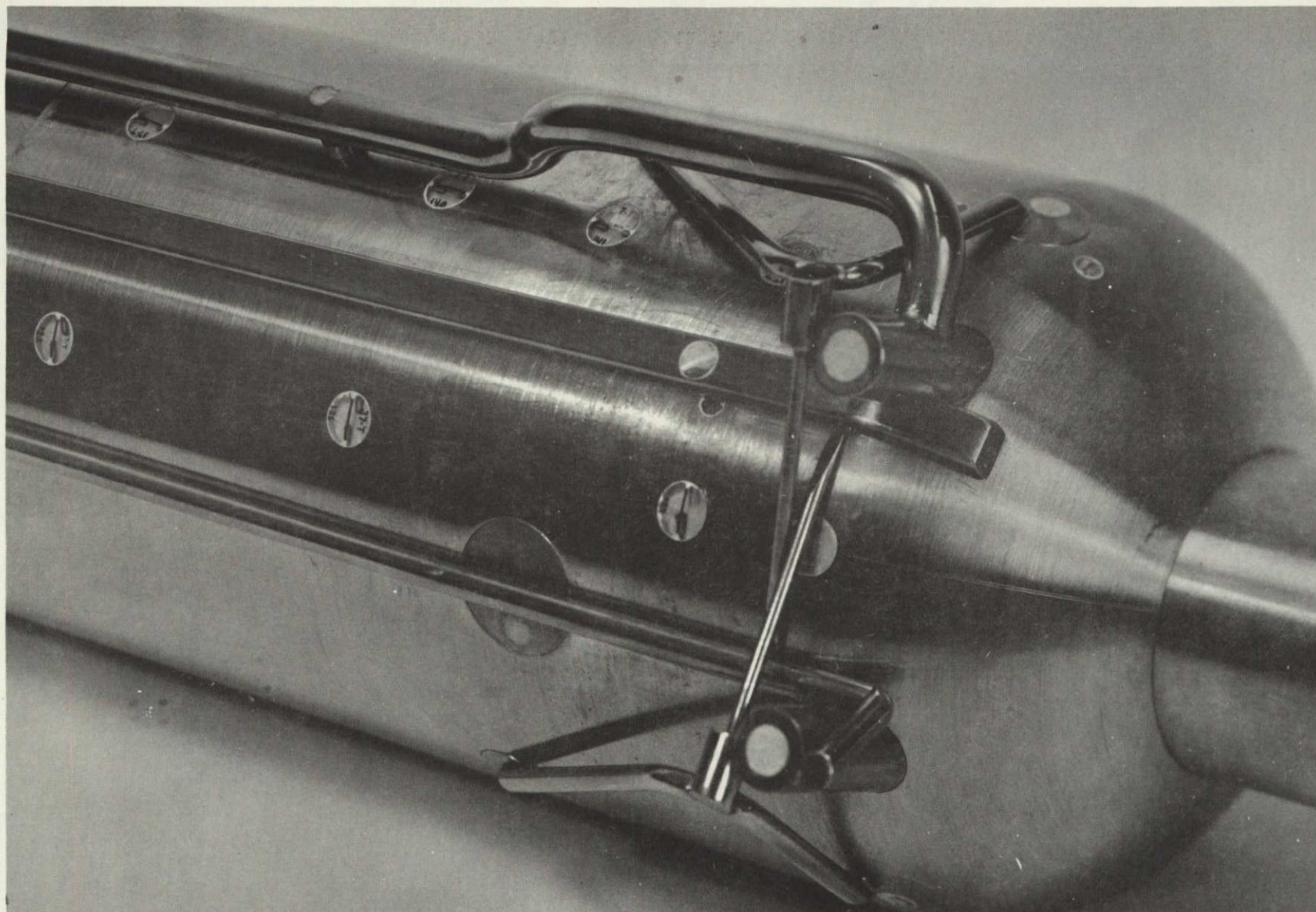


i. Instrumentation - Tank Forward Attachment Strut
Figure 3. - Continued.



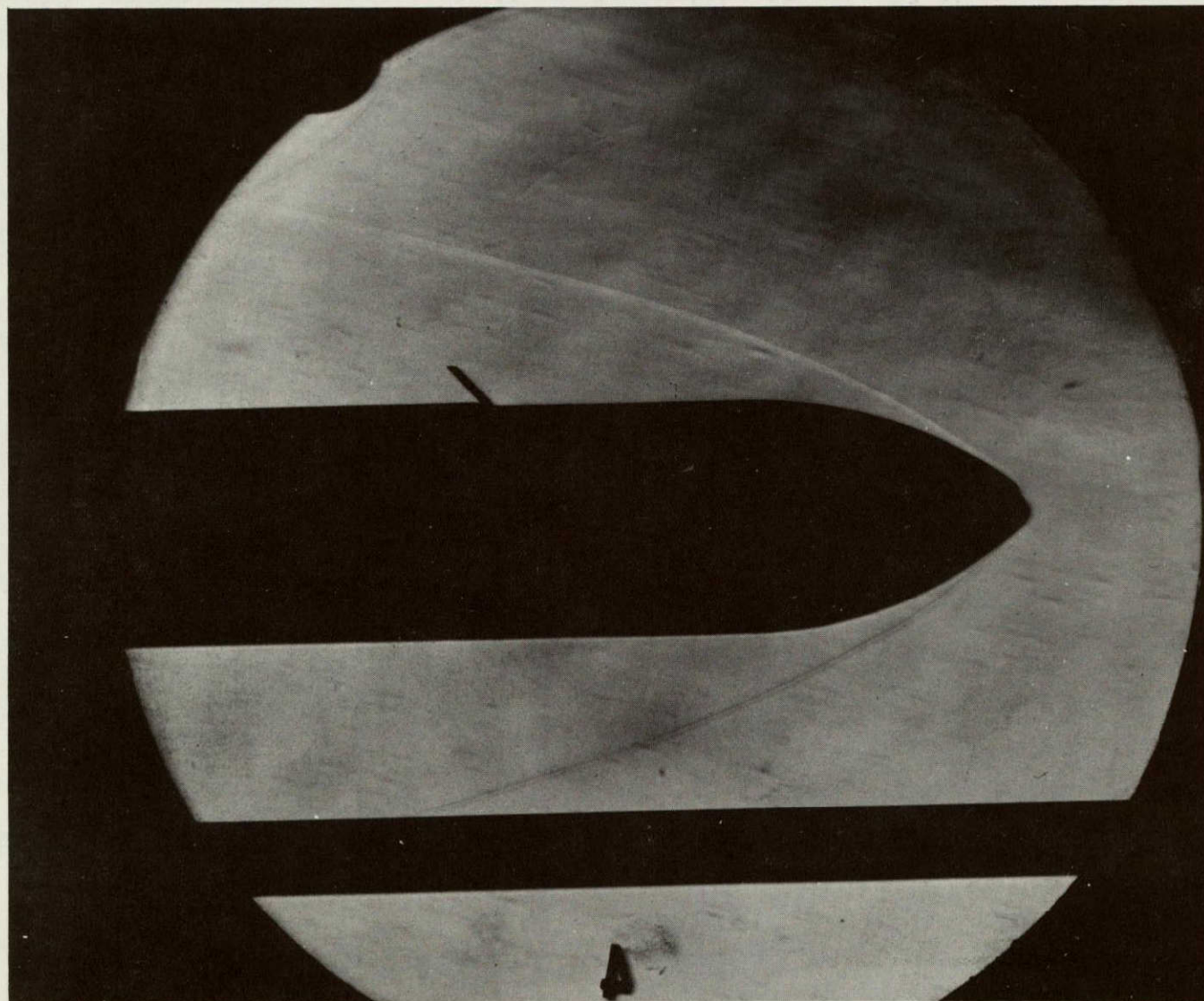
j. Instrumentation - Tank Aft Attachment Struts - Side View

Figure 3. - Continued.



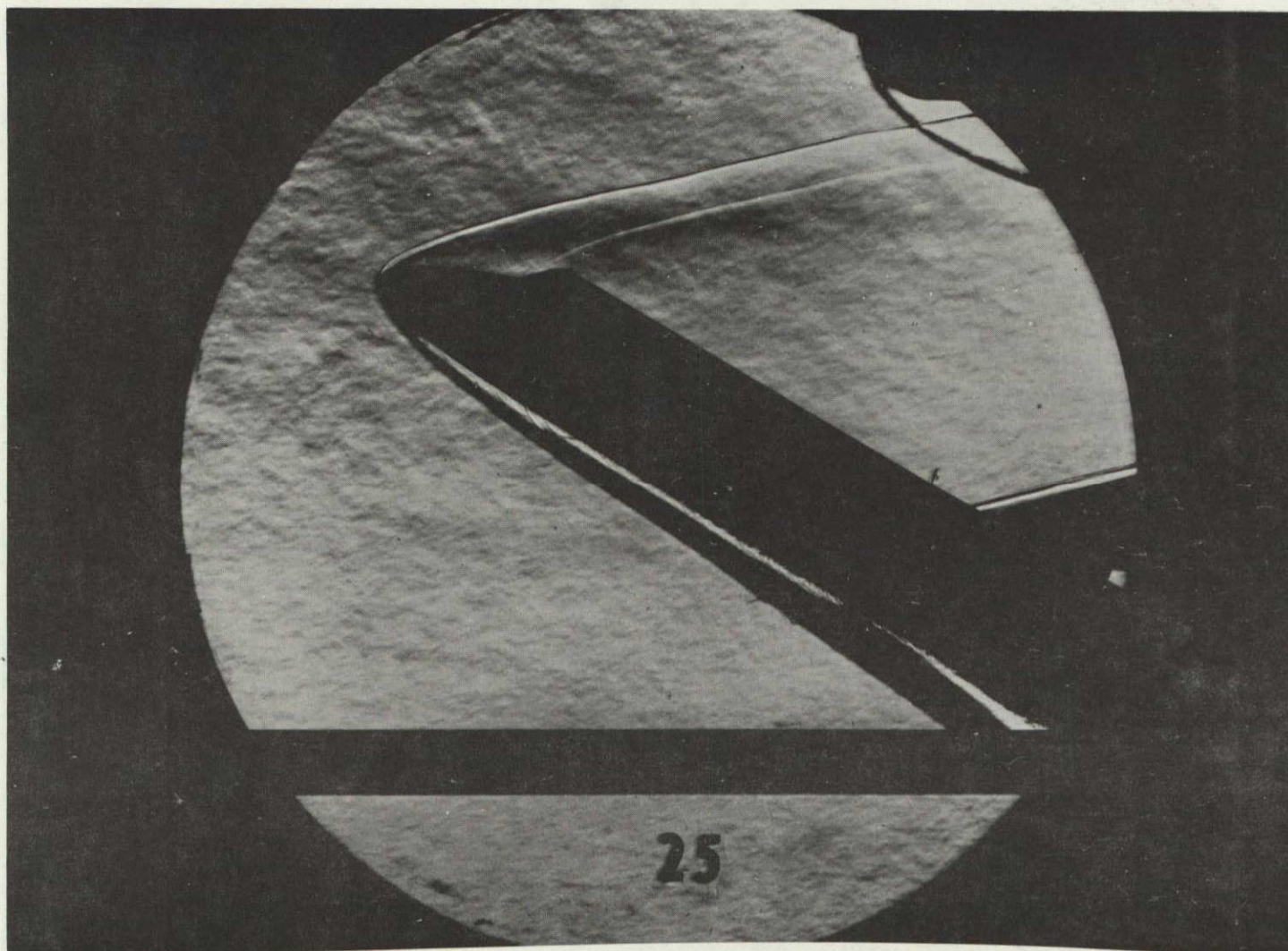
k. Instrumentation - Tank Aft Attachment Struts - Top View

Figure 3. - Continued.



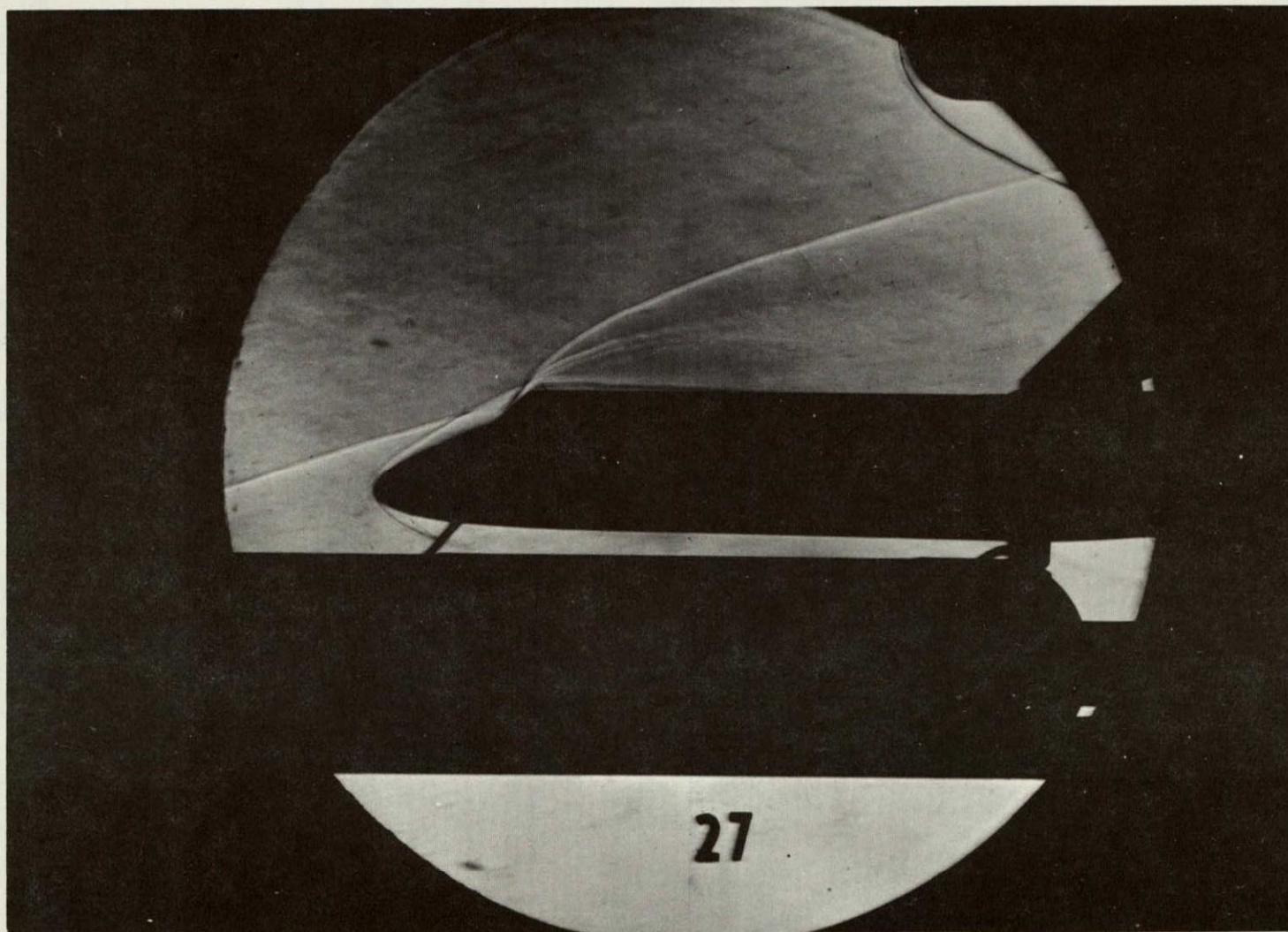
1. Sample Schlieren, Tank Alone, Run 4, $\alpha = 0^\circ$, $M_\infty = 6.99$, $R_e/ft = 0.12 \times 10^6$

Figure 3. - Continued.



m. Sample Schlieren, Orbiter Alone, Run 25, $\alpha = 30^\circ$, $M_\infty = 7.92$, $R_e/ft = 7.55 \times 10^6$

Figure 3. - Continued.



n. Sample Schlieren, Orbiter/Tank, Run 27, $\alpha = 0^\circ$, $M_\infty = 7.61$, $R_e/ft = 1.20 \times 10^6$

Figure 3. - Concluded.

DATA FIGURES
VOLUME 1--Figures 4-17

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OH12/1H21 (CAL HST 173-100) 37 T TANK (SUGT01)

| SYMBOL | HAW/HT | PHI | MACH | ALPHA | PARAMETRIC VALUES | |
|--------|--------|------|-------|-------|-------------------|------|
| | | | | | BETA | |
| ○ | .850 | .000 | 6.997 | | .000 | .000 |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, h/h_{REF}

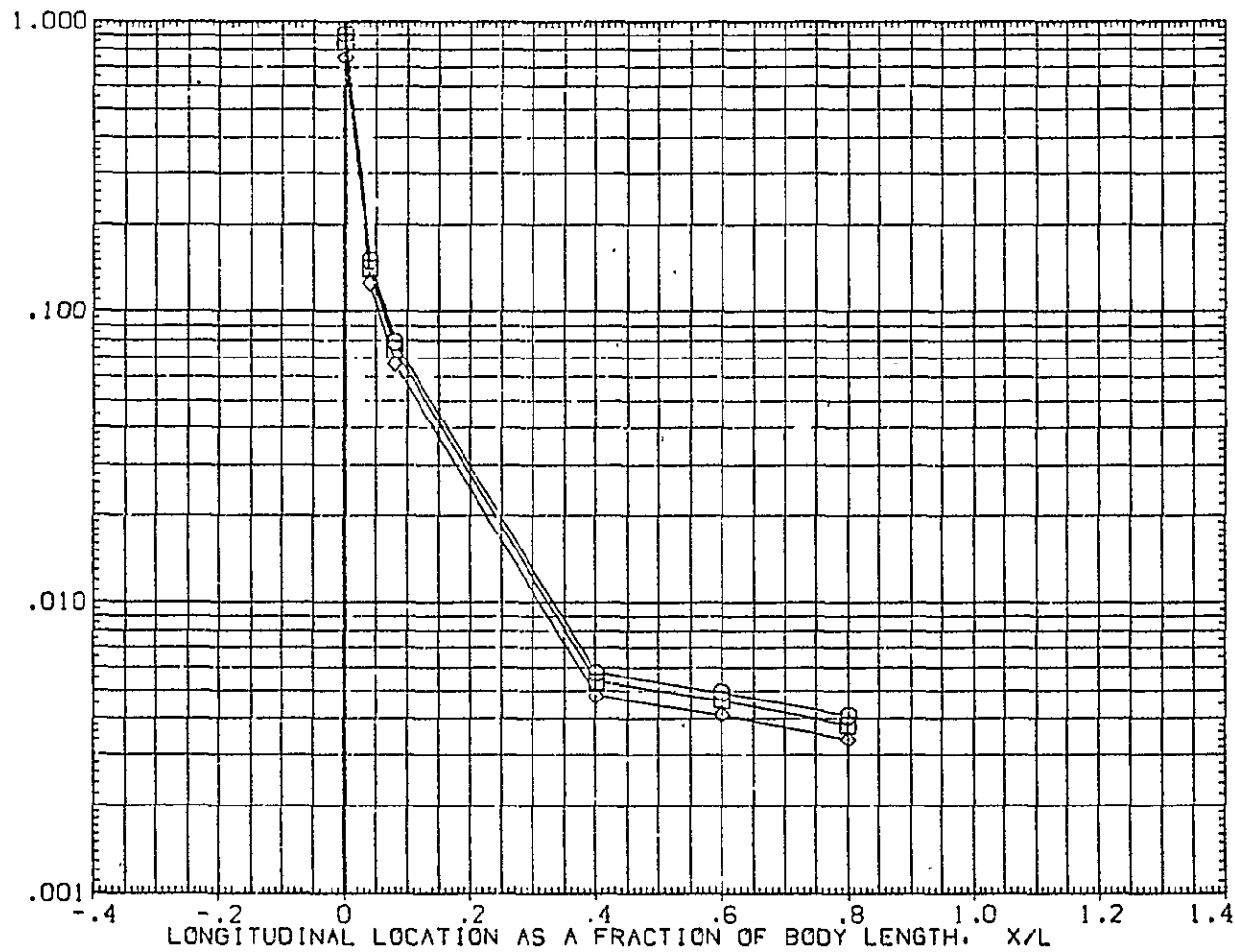


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR

0412/1H21 (CAL HST 173-100) 37 T TANK (SUGT01)

| | | | | | | |
|--------|--------|---------|-------|-------------------|------|------|
| SYMBOL | MAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
| □ | .830 | 183.030 | 6.993 | ALPHA | .000 | BETA |
| ◇ | 1.000 | | | | | .000 |

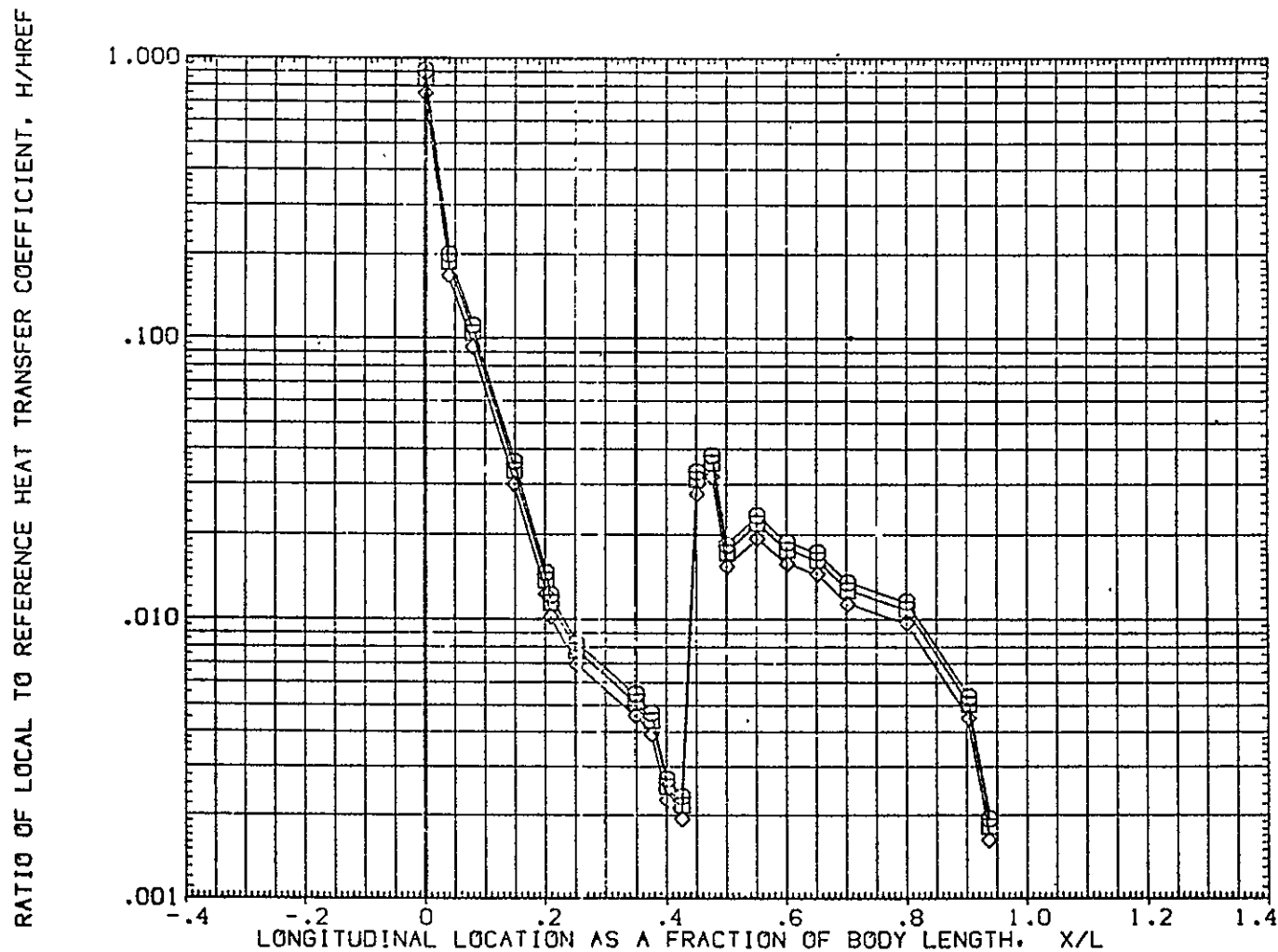


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

OH12/1H21 (CAL HST 173-100) 37 T TANK (SUGT01)

| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES |
|--------|--------|---------|-------|----------------------|
| ○ | .850 | 199.000 | 6.293 | ALPHA .000 BETA .000 |
| □ | .900 | | | |
| ◇ | 1.000 | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, h/h_{REF}

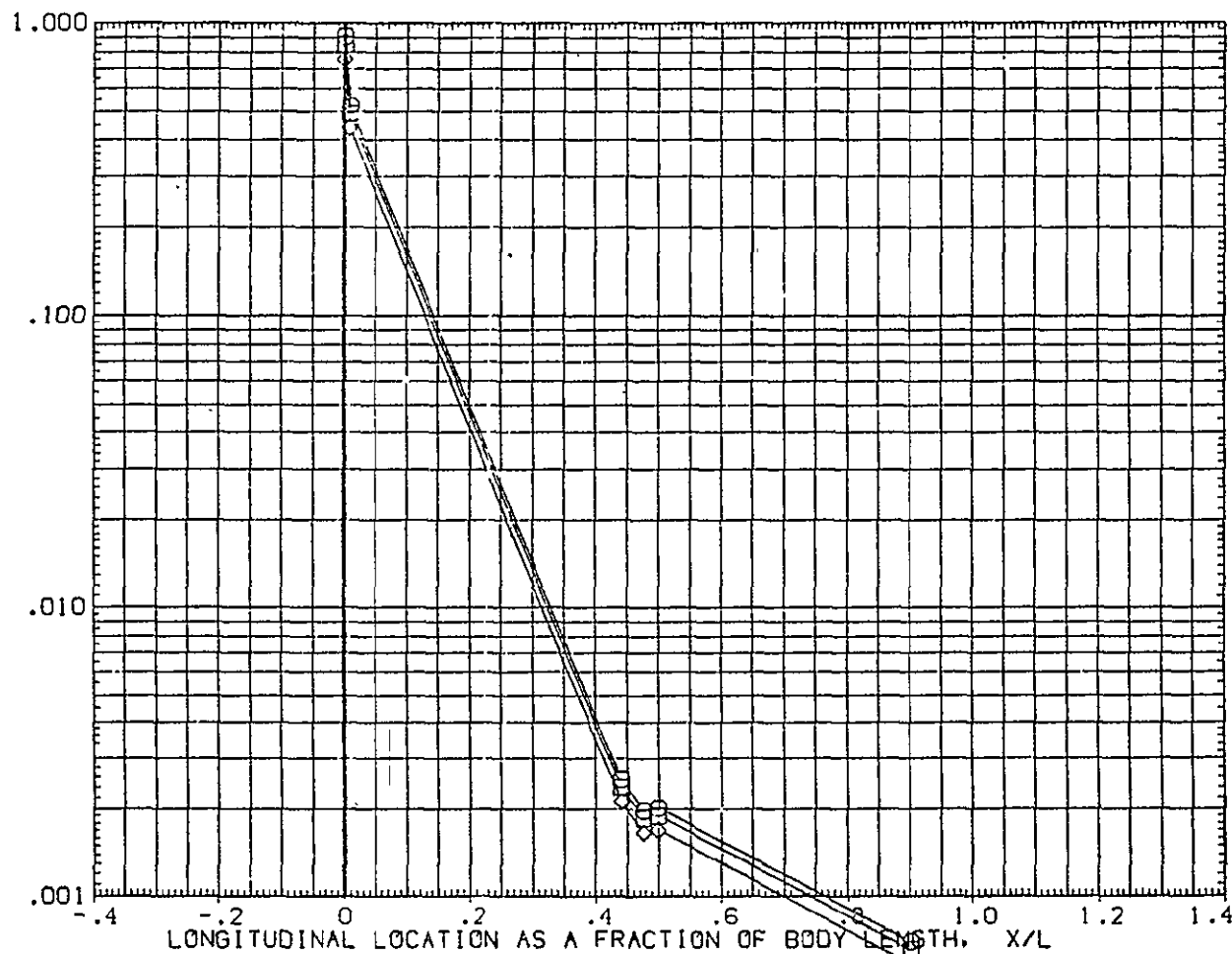


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER RN/L ALPHA = 0

OH12/IH21 (CAL HST 173-100) 37 T TANK (SUGT01)

| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
|--------|--------|---------|-------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| ○ | .850 | 221.000 | 6.993 | .000 | .000 | .000 |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

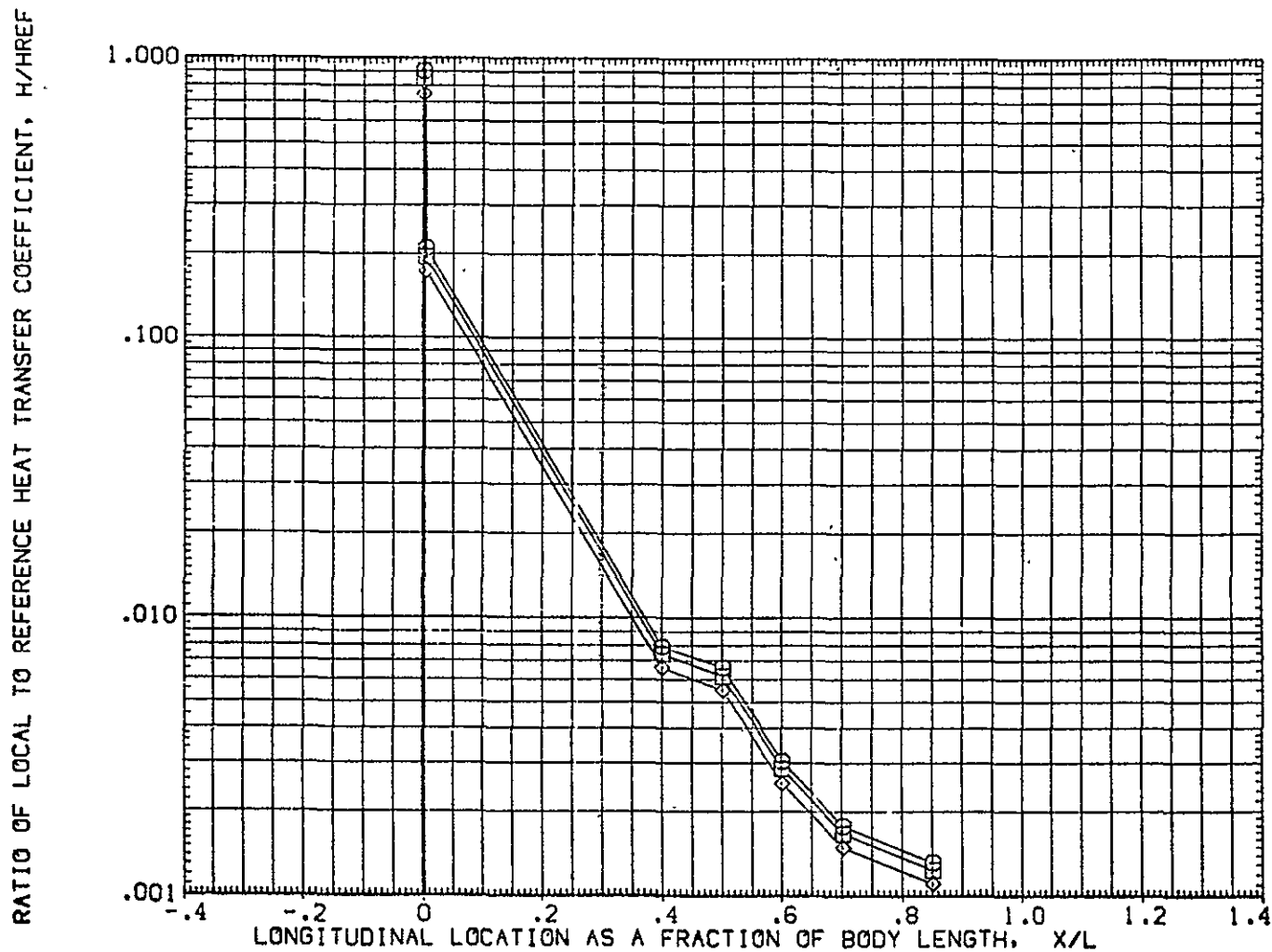


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

CH12/IH21 (CAL HST 173-100) 37 T TANK (SUGT01)

| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
|--------|--------|---------|-------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| ○ | .850 | 241.000 | 6.993 | .000 | | .000 |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

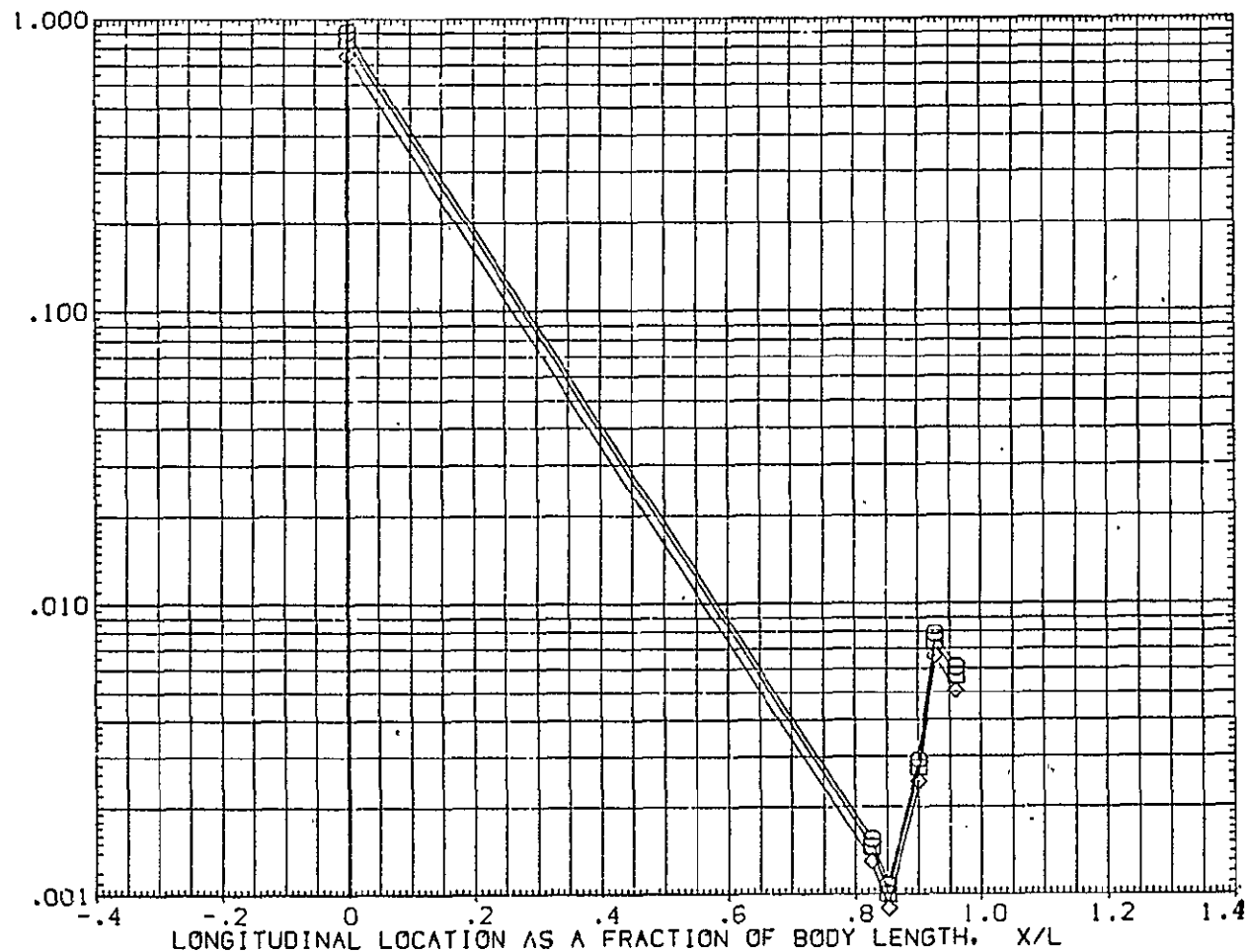


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

0H12/1H21 (CAL HST 173-100) 37 T TANK (SUGT01)

| SYMBOL | HAW/HT | PHI | MACH | ALPHA | PARAMETRIC VALUES | |
|--------|--------|---------|-------|-------|-------------------|------|
| □ | .850 | 247.000 | 6.993 | .000 | BETA | .000 |
| □ | .900 | | | | | |
| □ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, h/h_{REF}

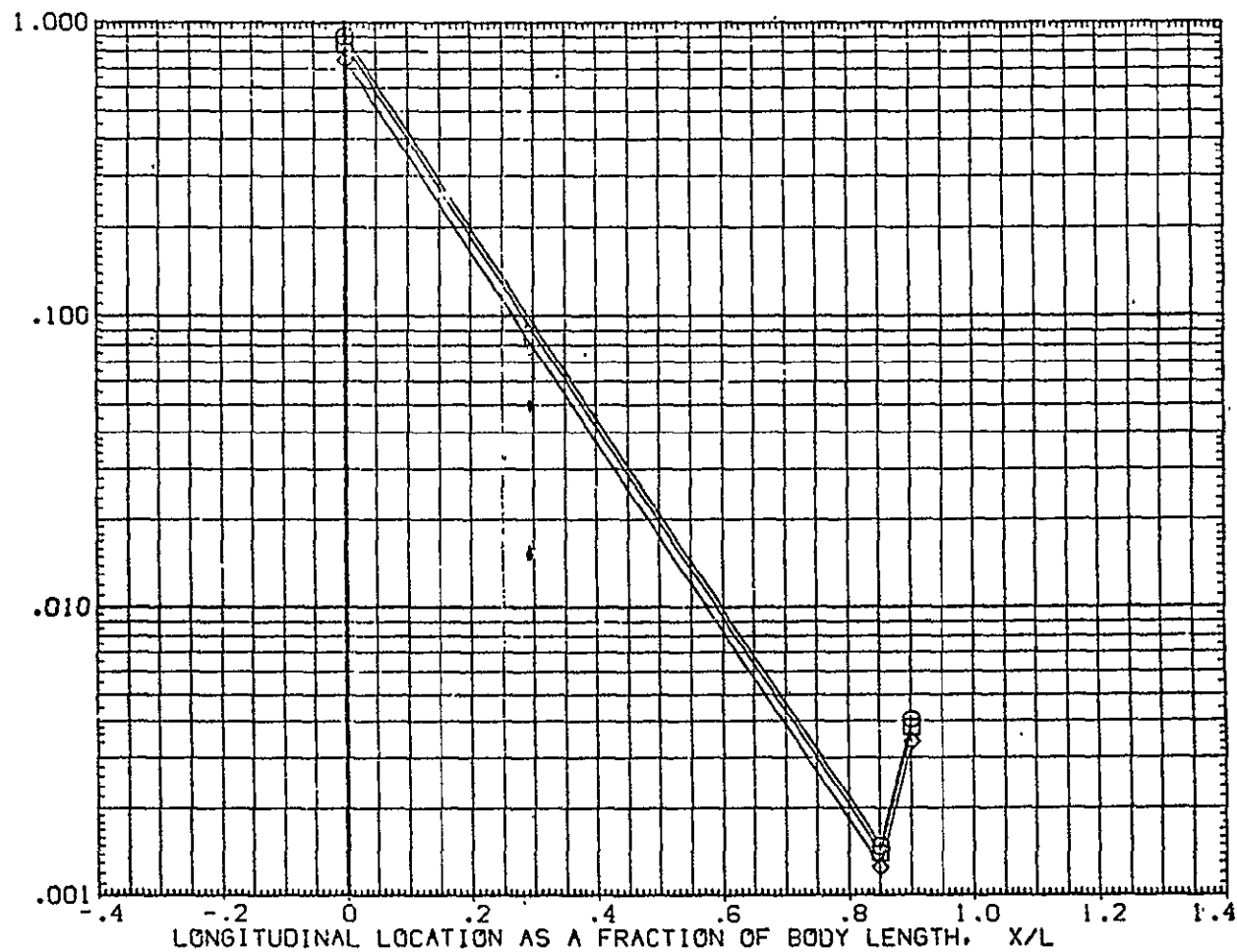


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

0H12/1H21 (CAL HST 173-100) 37 T TANK (SUGT01)

| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
|--------|--------|---------|-------|-------------------|------|--|
| | | | | ALPHA | BETA | |
| ○ | .850 | 270.000 | 6.993 | .000 | | |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

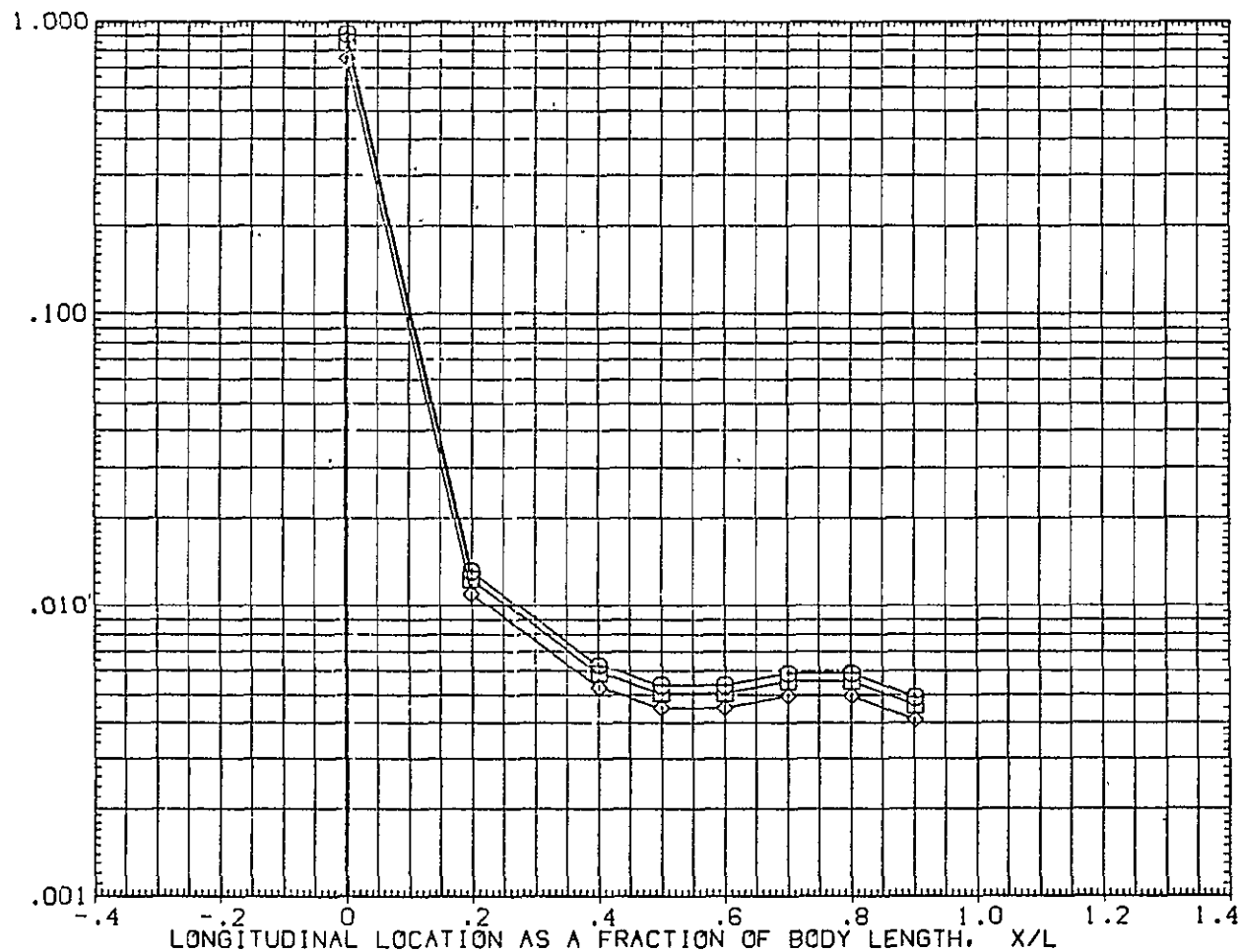


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR

OH12/1H21 (CAL HST 173-100) 37 T TANK (SUGT01)

| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
|--------|--------|---------|-------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| ◇ | .850 | 315.000 | 6.993 | .000 | | .000 |
| □ | .900 | | | | | |
| ○ | 1.000 | | | | | |

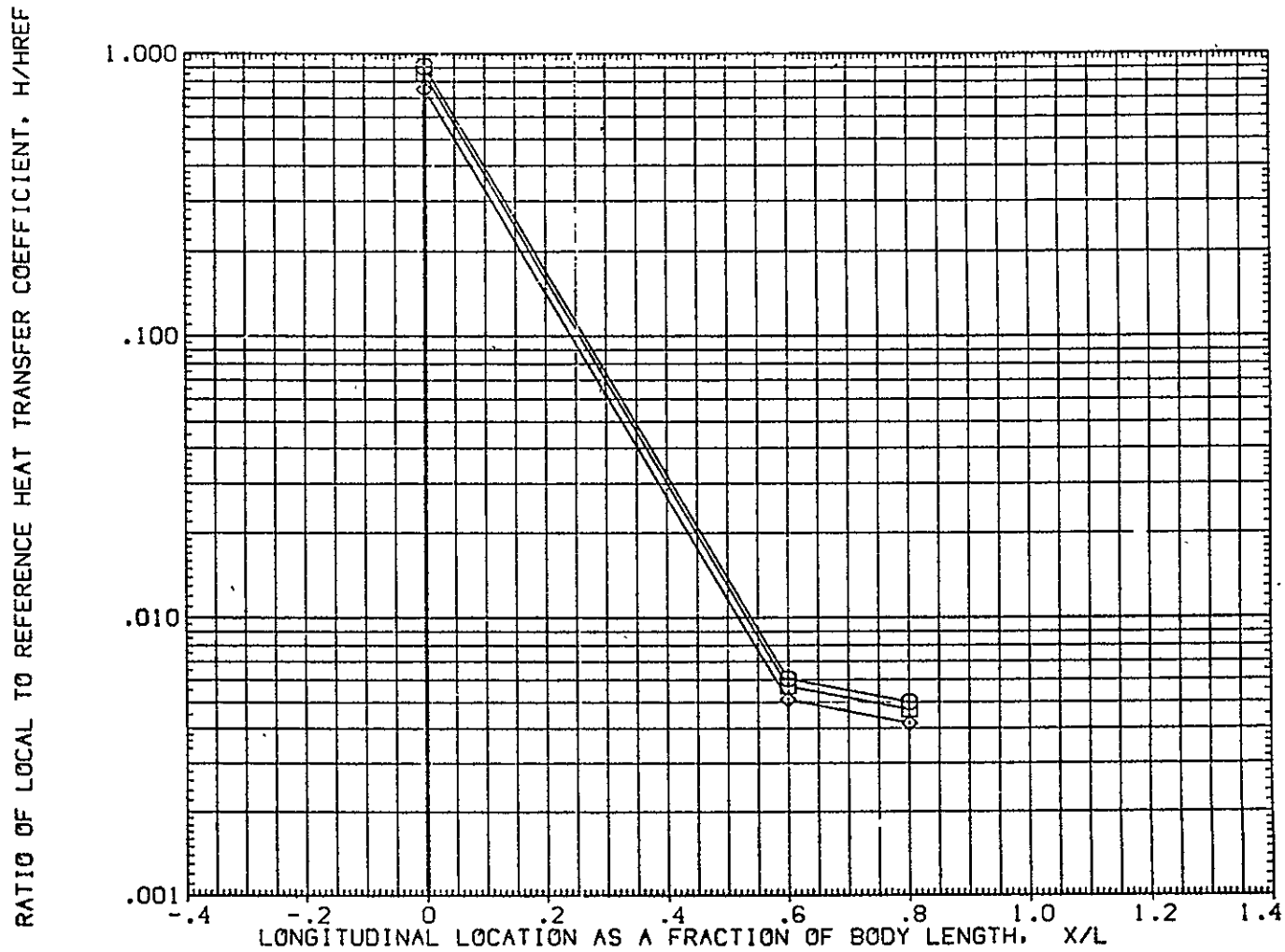


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

OH12/[H2] (CAL HST 173-100) 37 T TANK (SUGTOI)

| | | | | | | |
|--------|--------|------|-------|-------|-------------------|------|
| SYMBOL | HAW/HT | PHI | MACH | ALPHA | PARAMETRIC VALUES | |
| ○ | .850 | .000 | 7.618 | | BETA | .000 |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

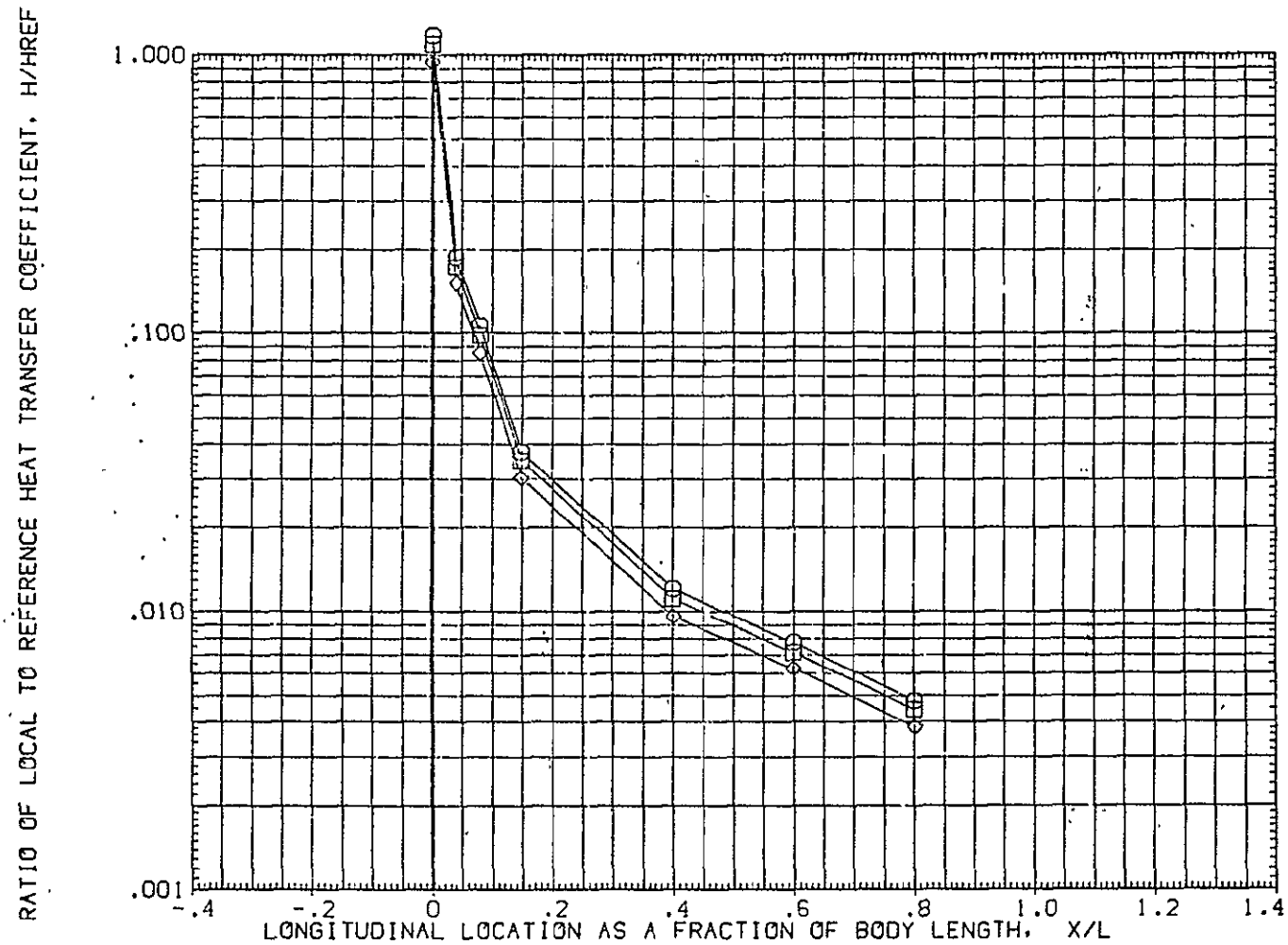


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

OH12/IH21 (CAL HST 173-100) 37 T TANK (SUGT01)

| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
|--------|--------|---------|-------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| ○ | .850 | 180.000 | 7.618 | .000 | | .000 |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

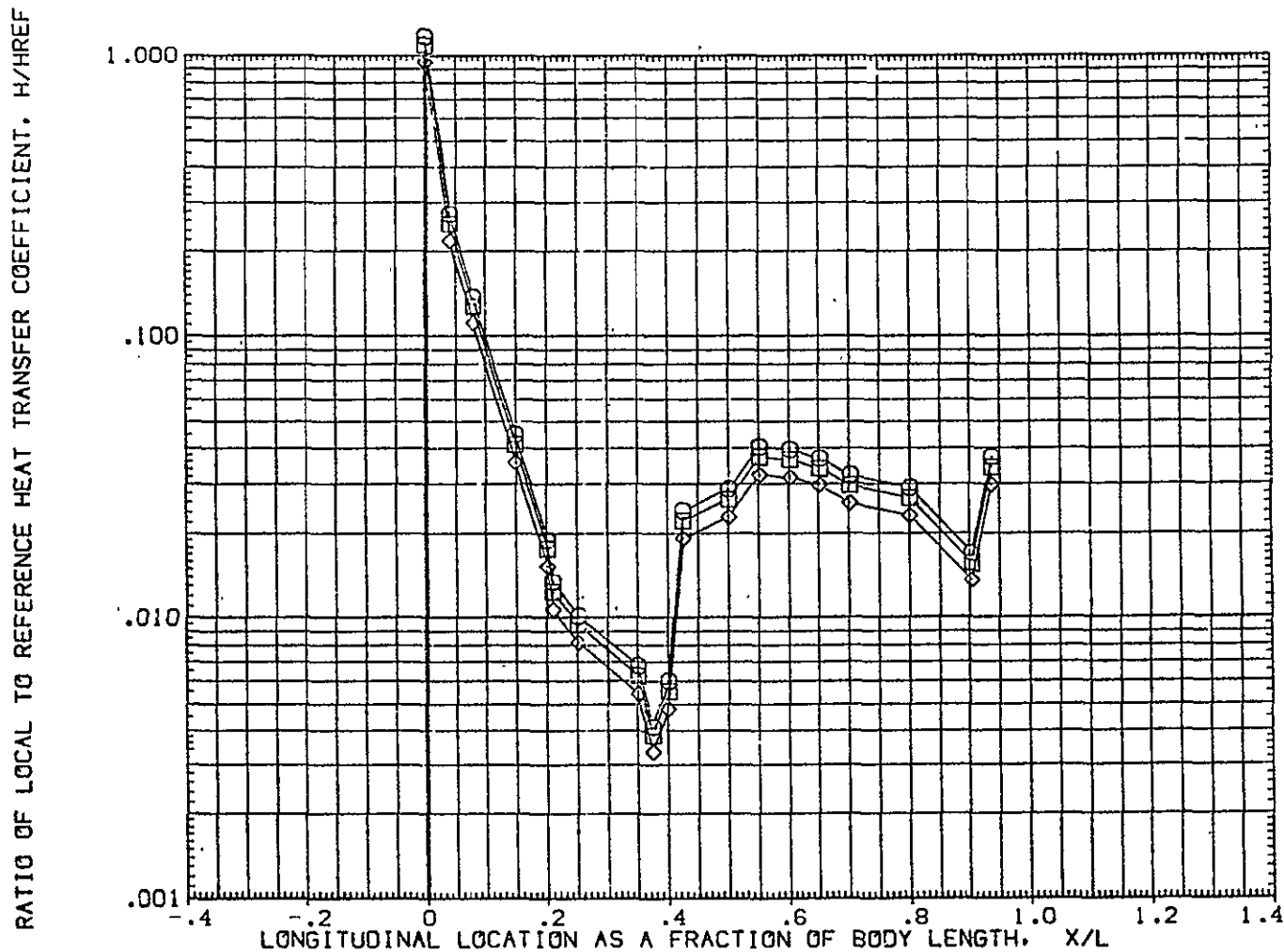


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

OH12/1H21 (CAL HST 173-100) 37 T TANK (SUGT01)

| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
|--------|--------|---------|-------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| ○ | .850 | 199.000 | 7.618 | .000 | | .000 |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

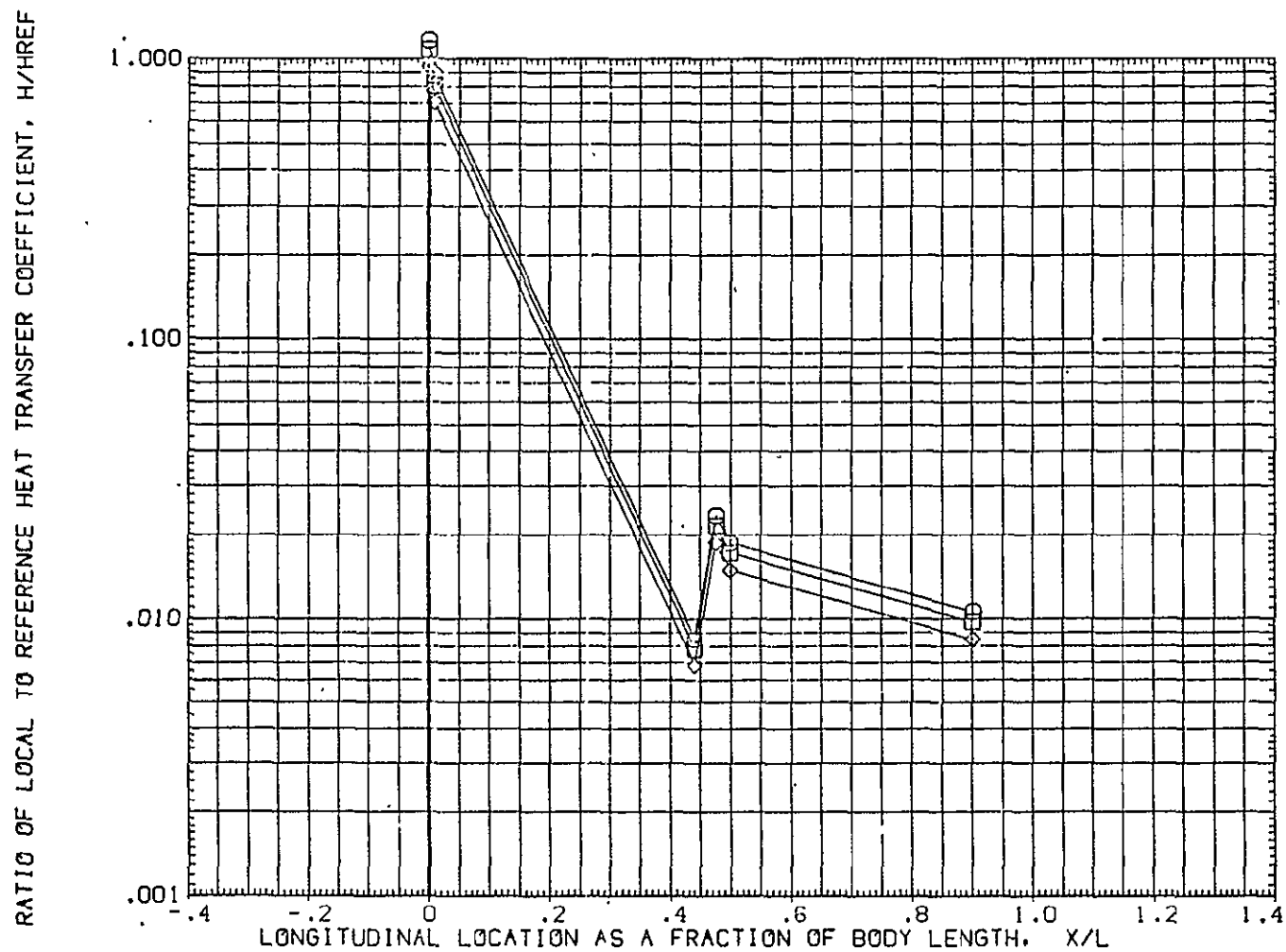


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

OH12/IH21 (CAL HST 173-100) 37 T TANK (SUGT01)

| SYMBOL | HAY/HT | PHI | MACH | PARAMETRIC VALUES | | |
|--------|--------|---------|-------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| ◇ | .850 | 221.000 | 7.618 | .000 | .000 | .000 |
| □ | .900 | | | | | |
| ○ | 1.000 | | | | | |

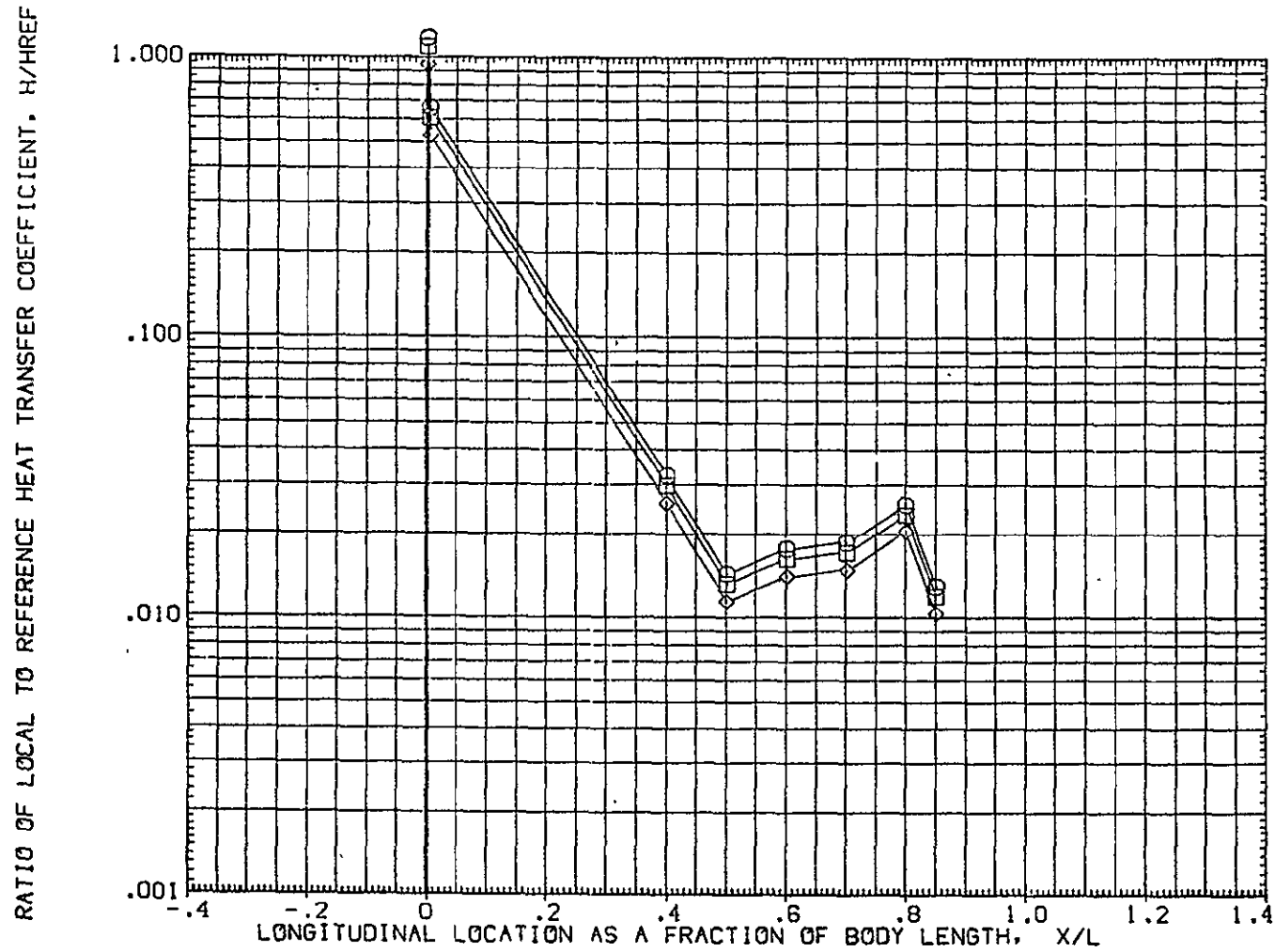


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR

0H12/IH21 (CAL HST 173-100) 37 T TANK (SUGTO1)

| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
|--------|--------|---------|-------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| ○ | .850 | 241.000 | 7.618 | .000 | | .000 |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

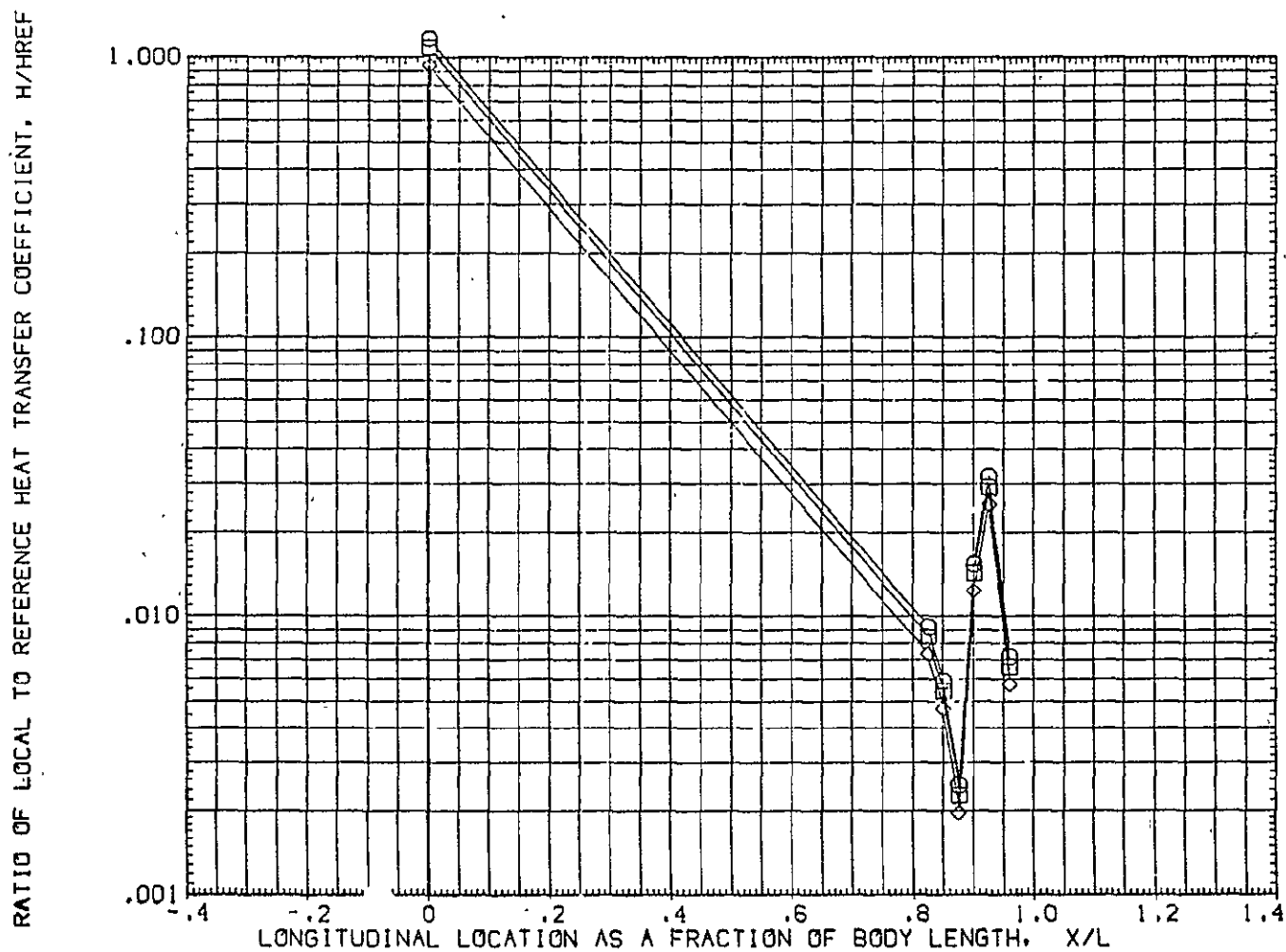


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

0H12/IH21 (CAL HST 173-100) 37 T TANK (SUGT01)

| | | | | | | | |
|--------|--------|---------|-------|-------|-------------------|------|------|
| SYMBOL | HAW/HT | PHI | MACH | ALPHA | PARAMETRIC VALUES | | |
| ○ | .850 | 247.000 | 7.618 | | .000 | BETA | .000 |
| □ | .900 | | | | | | |
| ◇ | 1.000 | | | | | | |

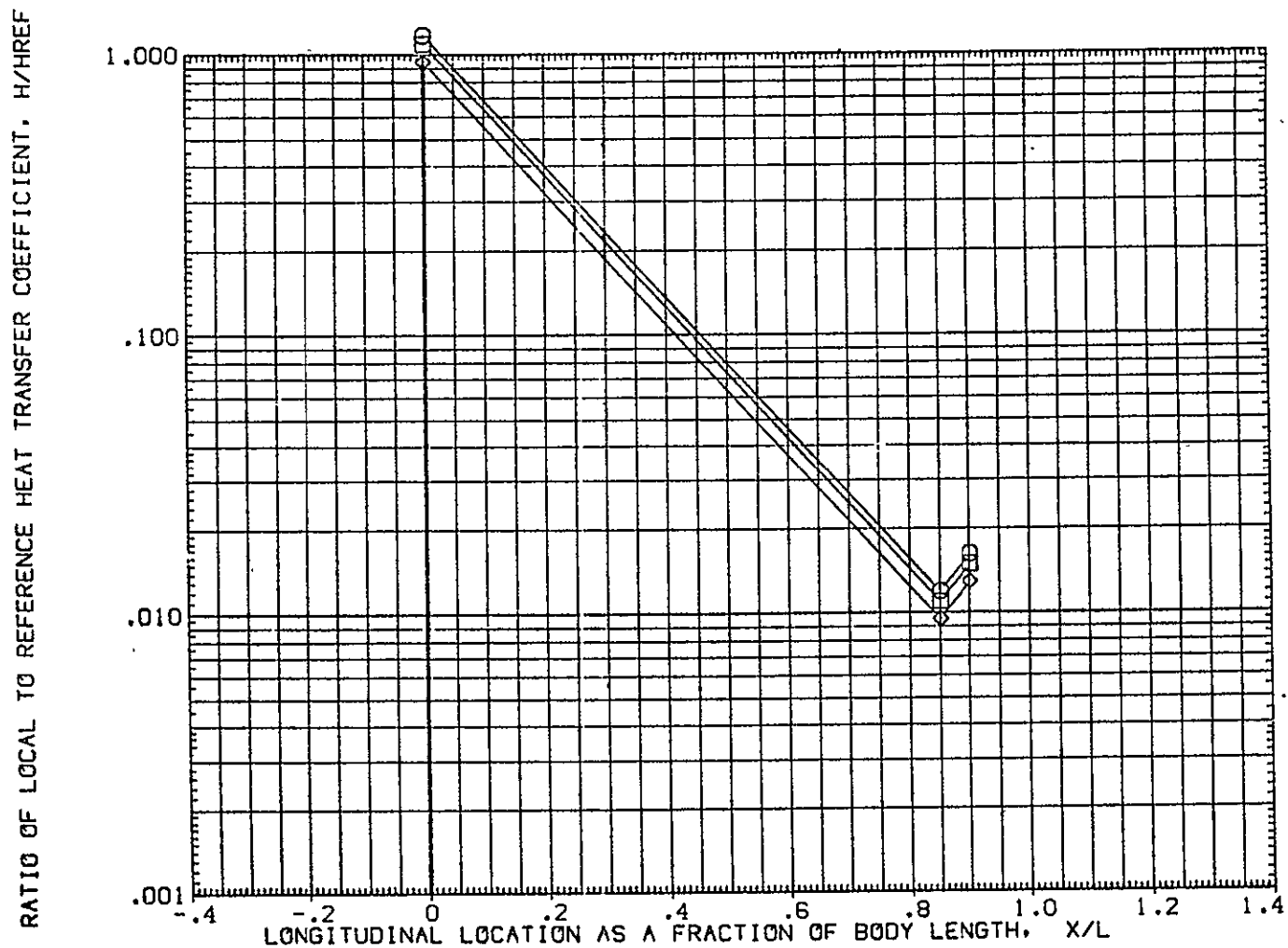


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER RN/L ALPHA = 0

OH12/1H21 (CAL HST 173-100) 37 T TANK (SUGT01)

| | | | | | | |
|--------|--------|---------|-------|-------|-------------------|------|
| SYMBOL | HAW/HT | PHI | MACH | ALPHA | PARAMETRIC VALUES | |
| ○ | .850 | 270.000 | 7.618 | .000 | BE1A | .000 |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

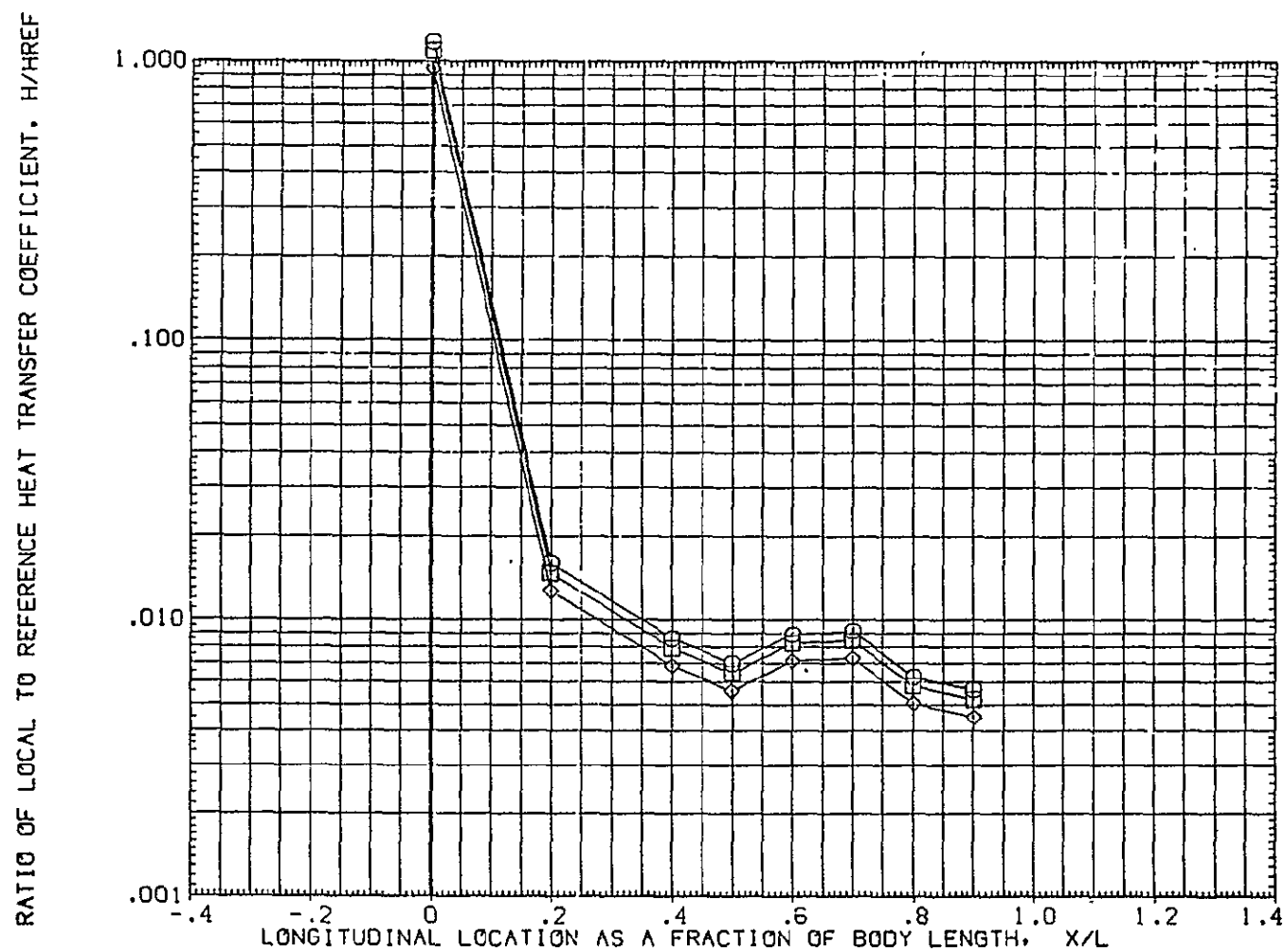


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ $\alpha = 0$

CH12/iH21 (CAL HST 173-100) 37 T TANK (SUGT01)

| | | | | | | |
|--------|--------|---------|-------|-------------------|------|------|
| SYMBOL | HAV/HT | PHI | MACH | PARAMETRIC VALUES | | |
| ◇ | .850 | 315.000 | 7.618 | ALPHA | .000 | BETA |
| □ | .900 | | | | | .000 |
| ○ | 1.000 | | | | | |

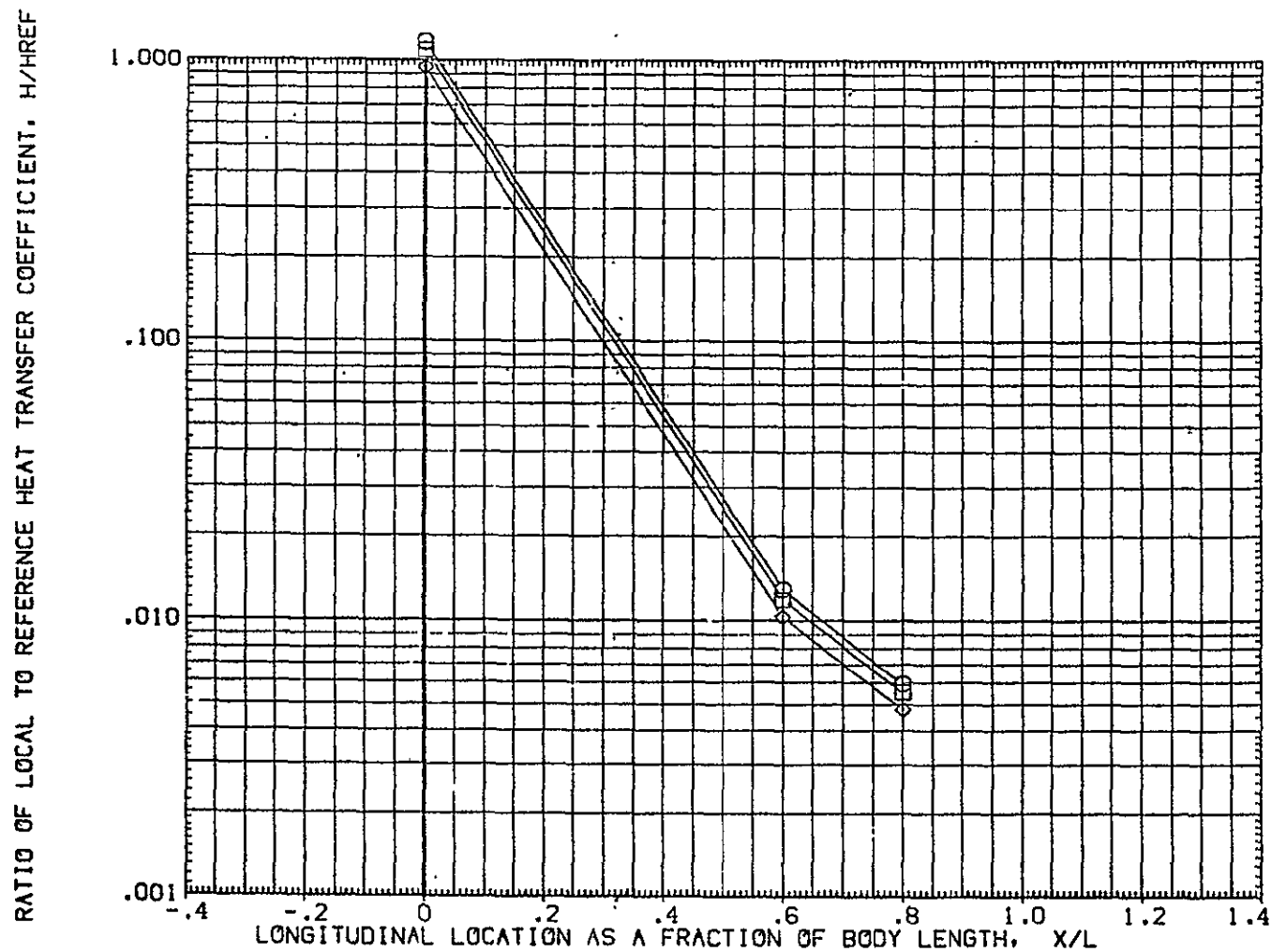


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

OH12/1H21 (CAL HST 173-100) 37 T TANK (SUGT01)

| | | | | | | |
|--------|--------|------|--------|-------|-------------------|------|
| SYMBOL | MAW/HT | PHI | MACH | ALPHA | PARAMETRIC VALUES | |
| ○ | .850 | .000 | 15.990 | | .000 | BETA |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | .000 |

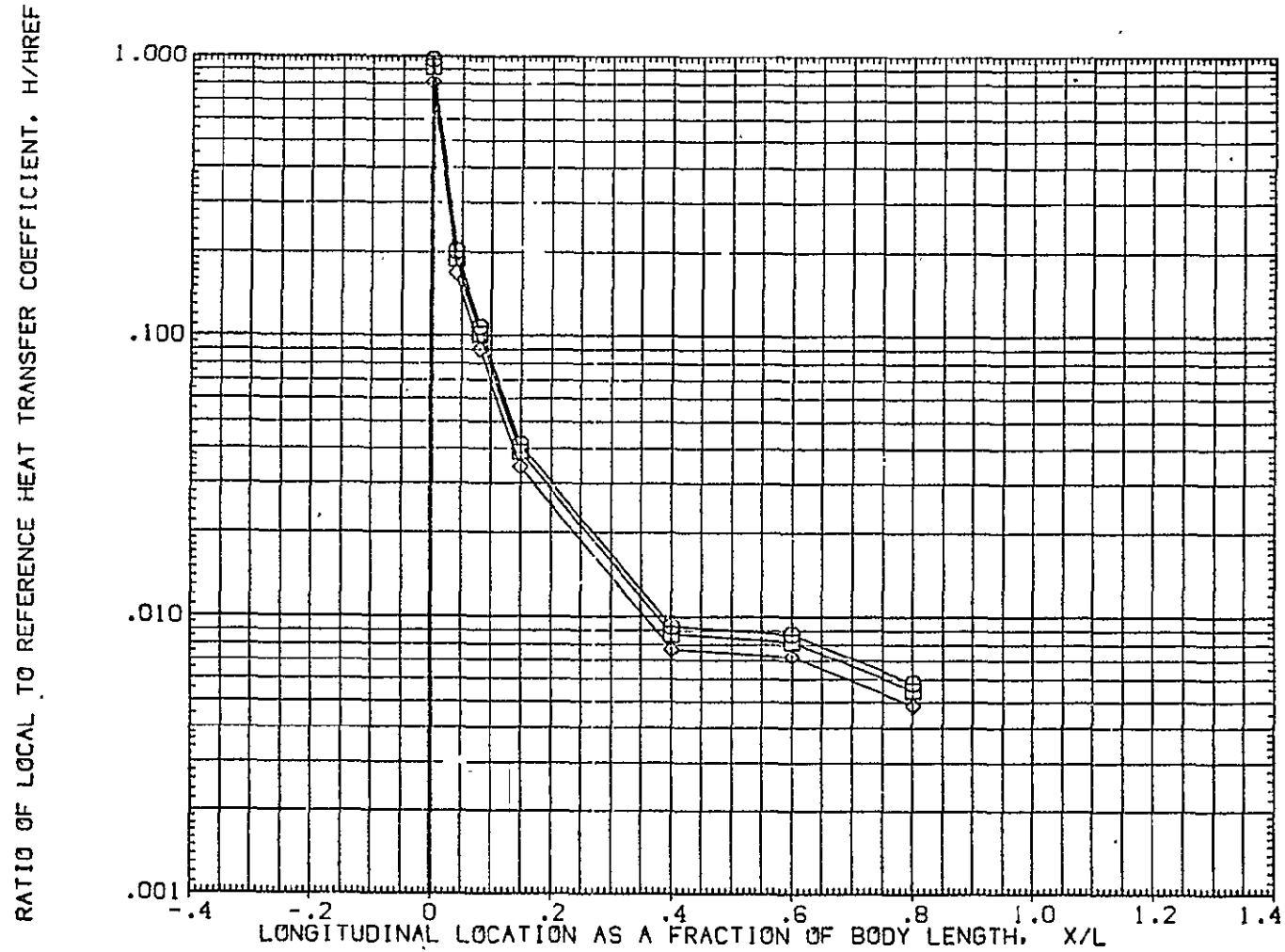


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

OH12/IH21 (CAL HST 173-100) 37 T

TANK (SUGT01)

| SYMBOL | HAW/HT | PHI | MACH |
|--------|--------|---------|--------|
| ○ | .850 | 180.000 | 15.990 |
| □ | .900 | | |
| ◇ | 1.000 | | |

| PARAMETRIC VALUES | |
|-------------------|------|
| ALPHA | BETA |
| .000 | .000 |

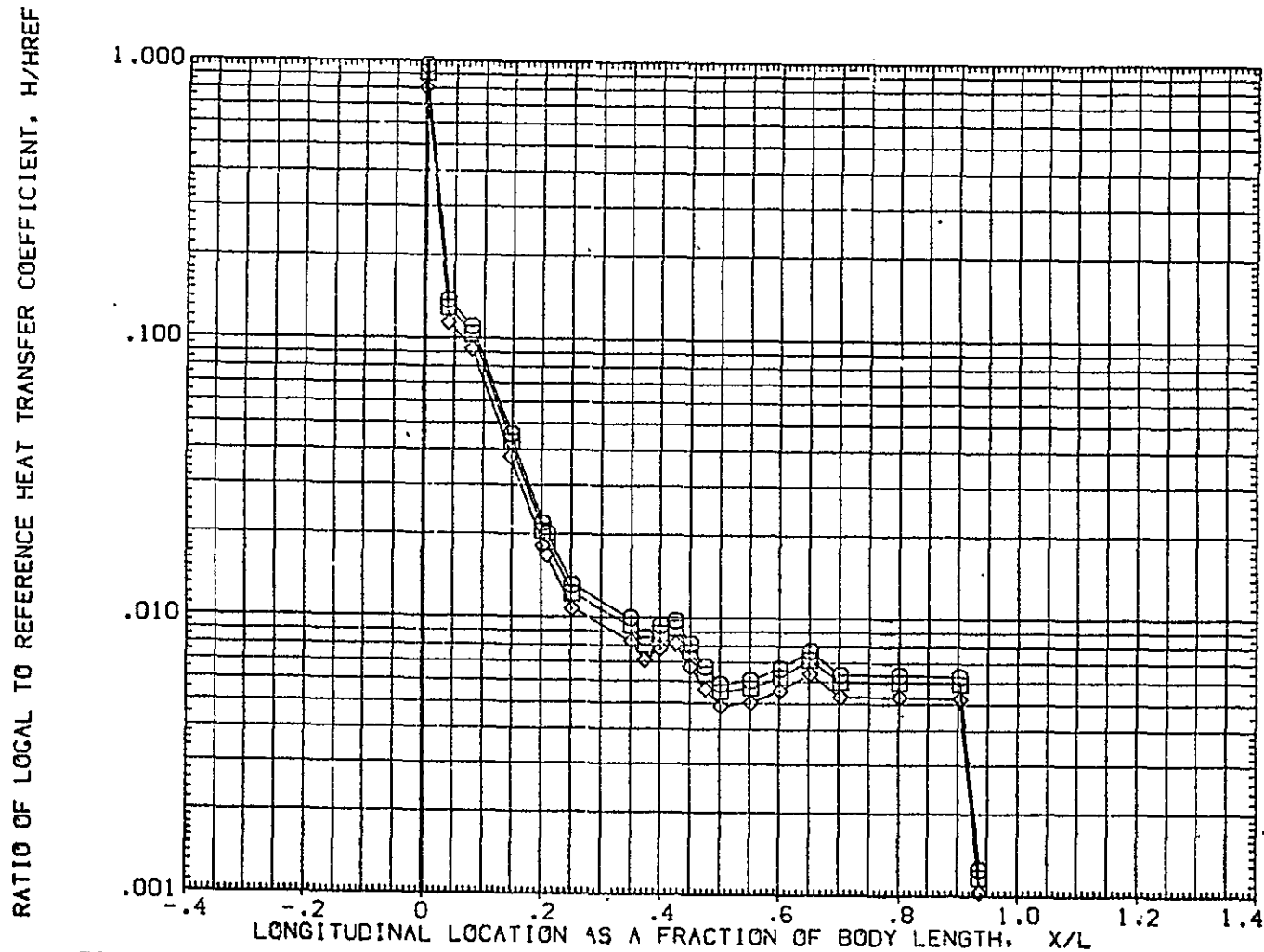


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

OH12/IH21 (CAL HST 173-100) 37 T TANK (SUGT01)

| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
|--------|--------|---------|--------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| ○ | .850 | 199.000 | 15.990 | .000 | | .000 |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

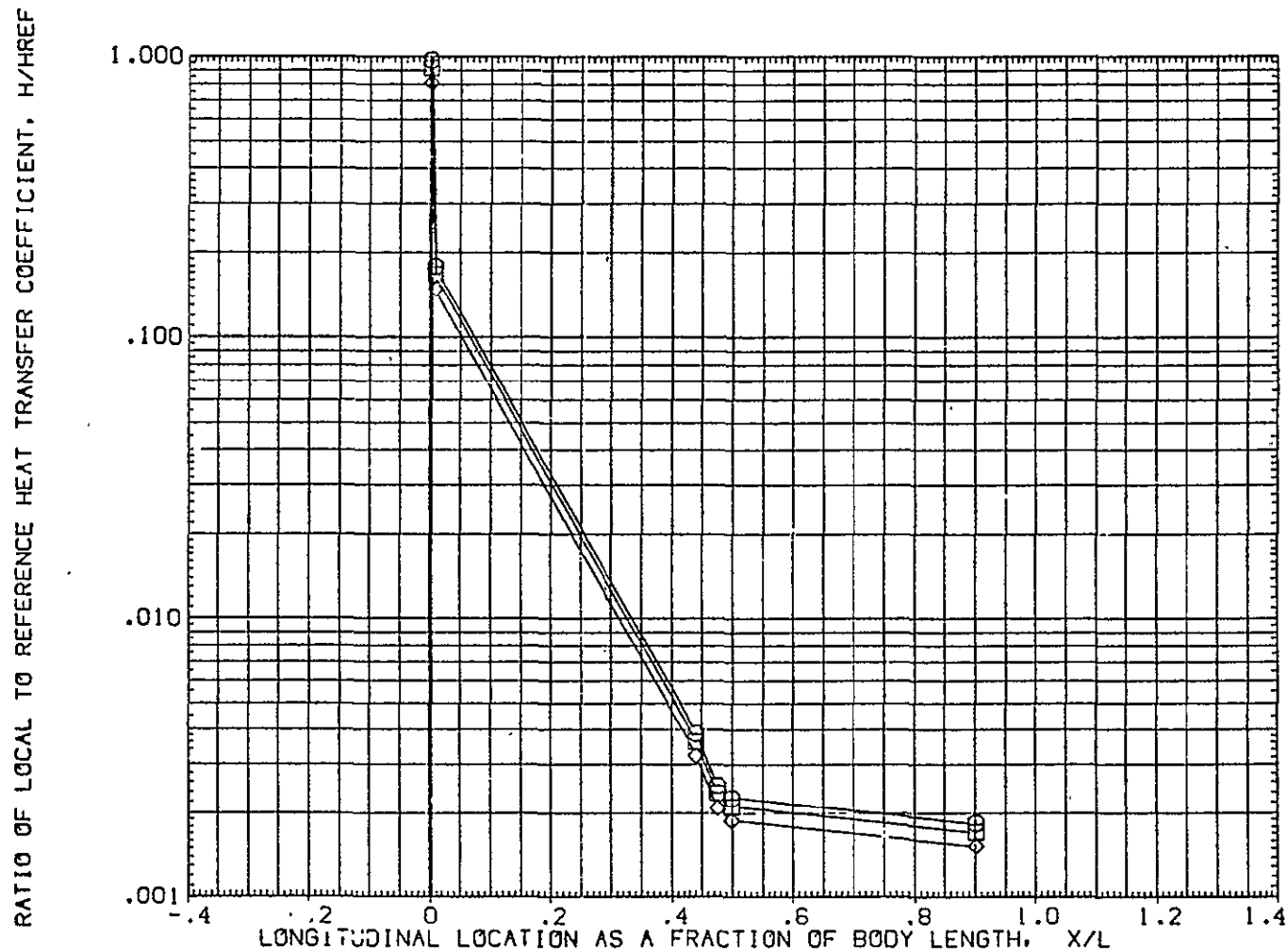


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER RN/L_1 ALPHA = 0

0H12/IH21 (CAL HST 173-100) 37 T TANK (SUGTO1)

| | | | | | | |
|--------|--------|---------|--------|-------------------|------|------|
| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
| ○ | .850 | 221.000 | 15.990 | ALPHA | .000 | BETA |
| □ | .900 | | | | | .000 |
| ◇ | 1.000 | | | | | |

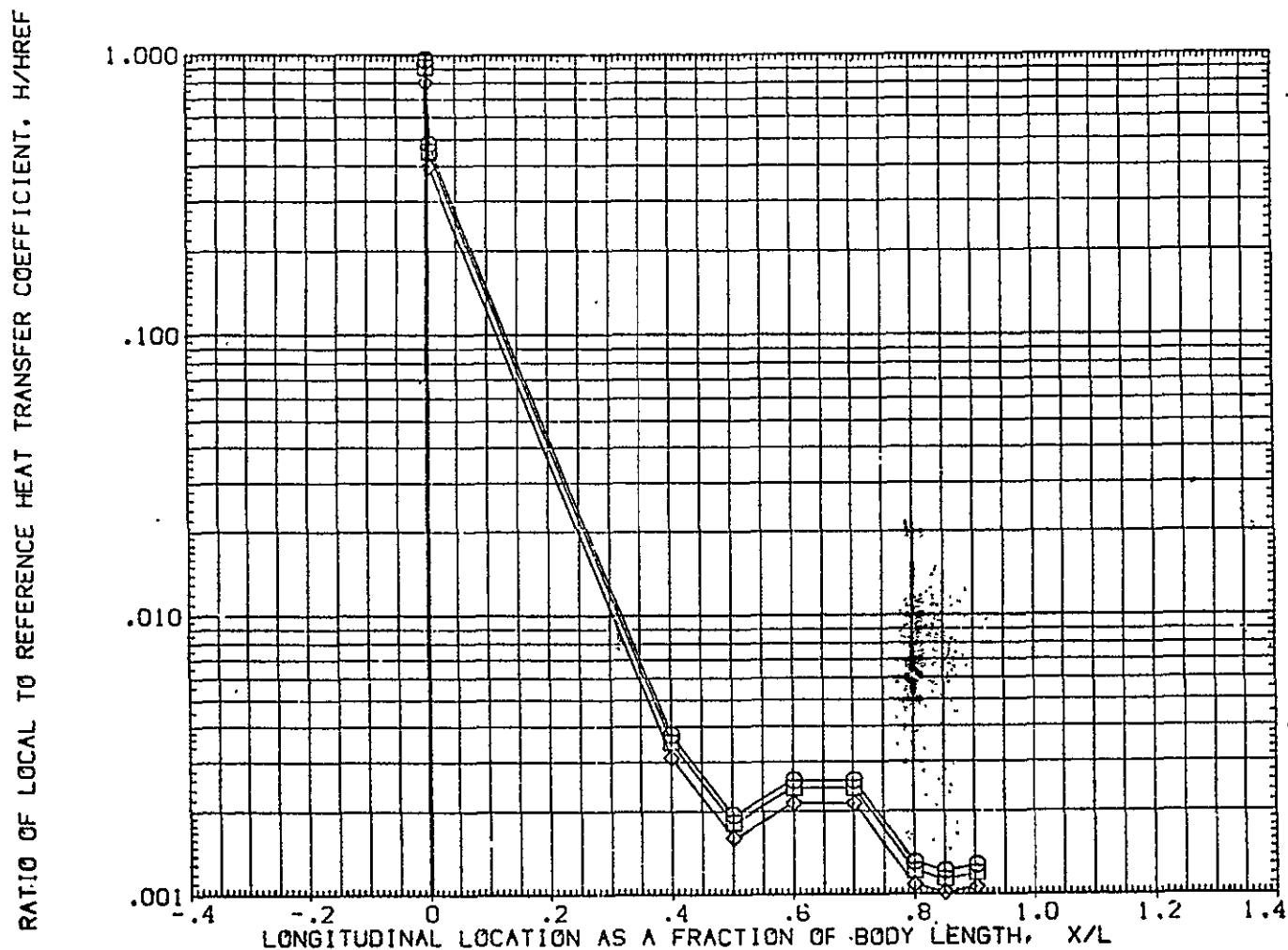


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR

CH12/IH21 (CAL HST 173-100) 37 T TANK (SUGT01)

| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
|--------|--------|---------|--------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| ○ | .850 | 241.000 | 15.990 | .000 | .000 | .000 |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, h/h_{REF}

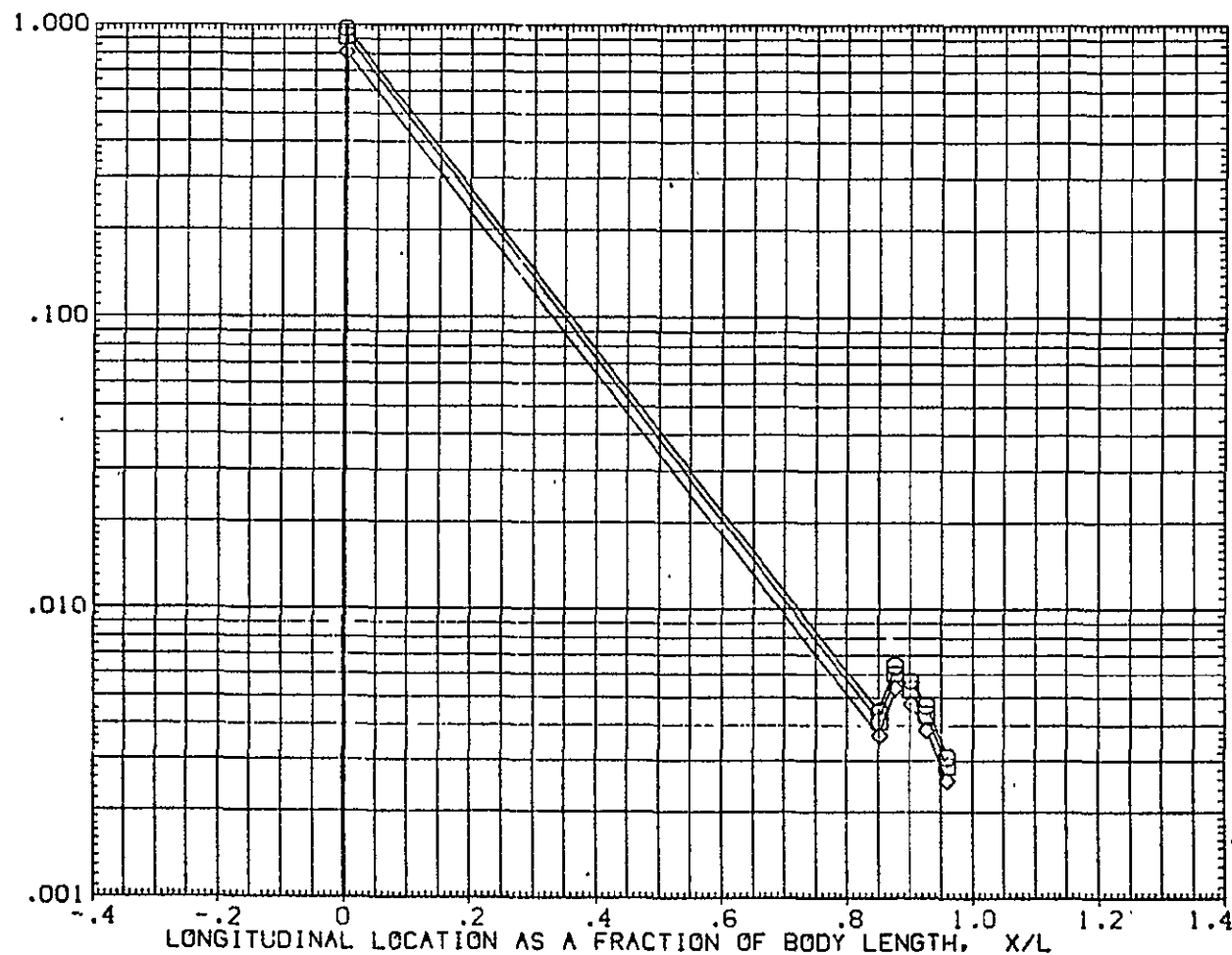


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ $\alpha = 0$

OH12/IH21 (CAL HST 173-100) 37 T TANK (SUGT01)

| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
|--------|--------|---------|--------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| ○ | .850 | 247.000 | 15.990 | .000 | BETA | .000 |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

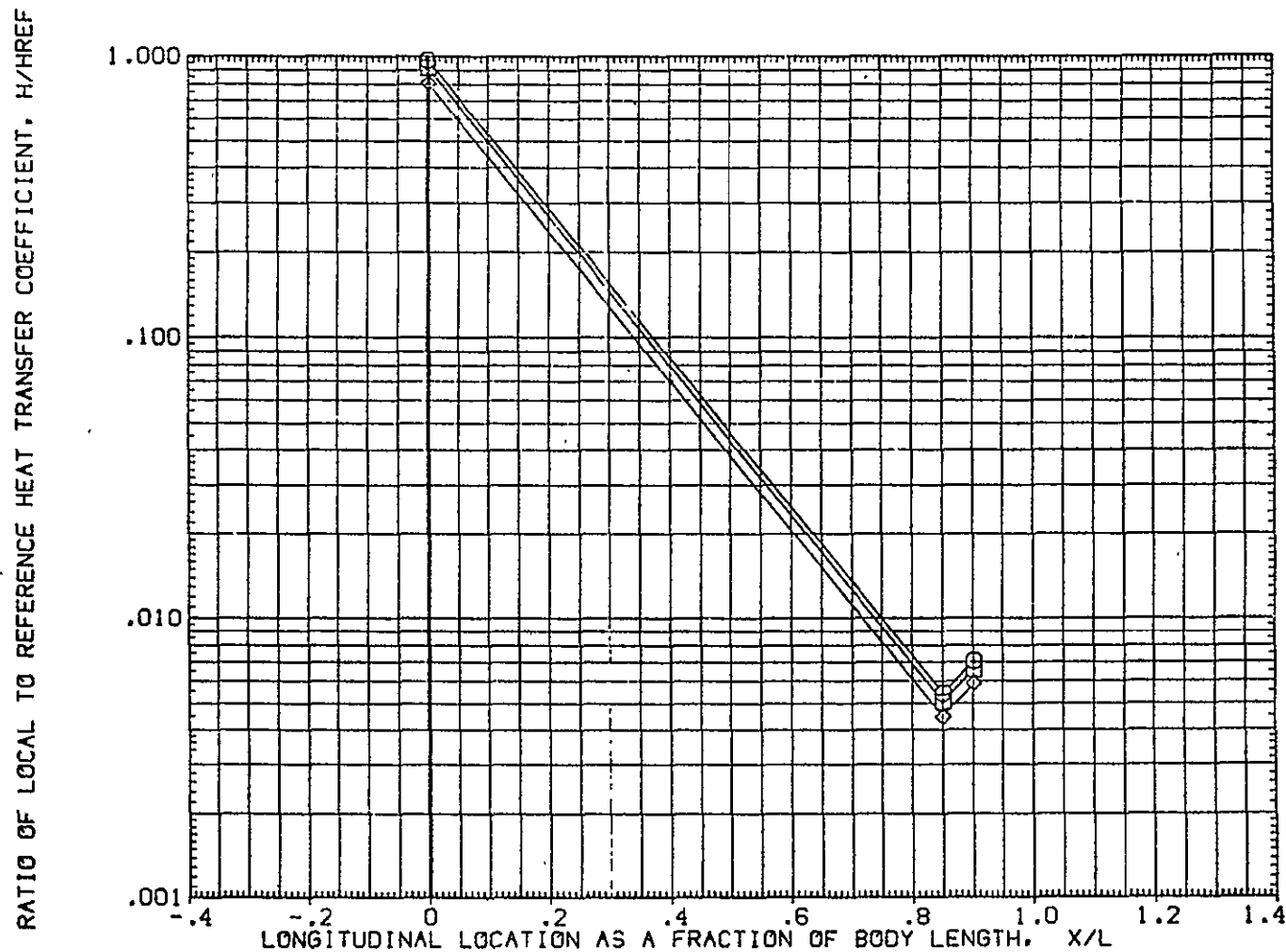


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

0H12/IH21 (CAL HST 173-100) 37 T

TANK

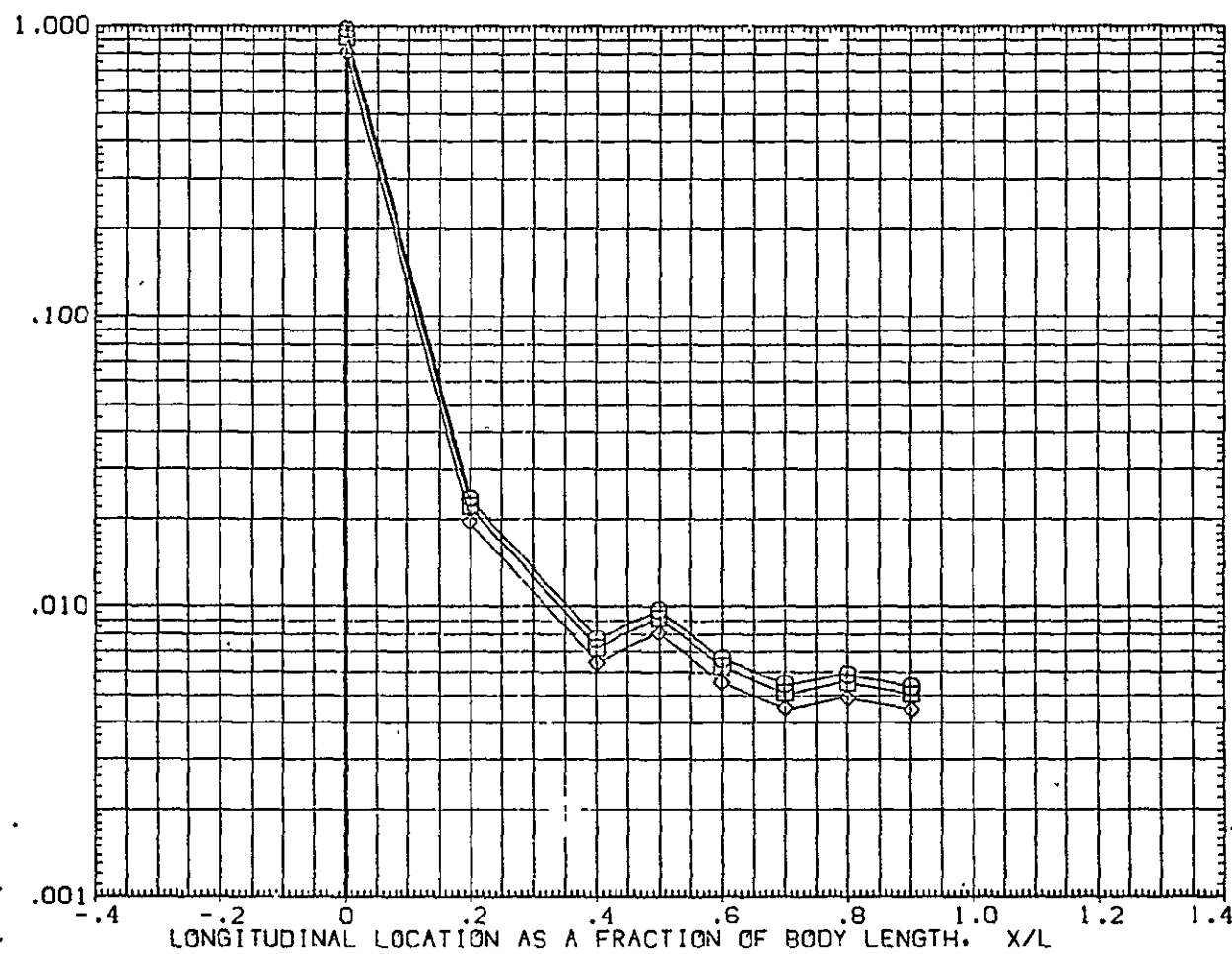
(SUGT01)

SYMBOL
□
◇HAW/HT
.850
.900
1.000PHI
270.000MACH
15.990

ALPHA

PARAMETRIC VALUES
.000 BETA

.000

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF} FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER RN/L ALPHA = 0

0H12/IH21 (CAL HST 173-100) 37 T TANK (SUGT01)

| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
|--------|--------|---------|--------|-------------------|------|------|
| ◇◇◇ | .850 | 315.000 | 15.990 | ALPHA | .000 | BETA |
| | .900 | | | | | |
| | 1.000 | | | | | .000 |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, h/h_{REF}

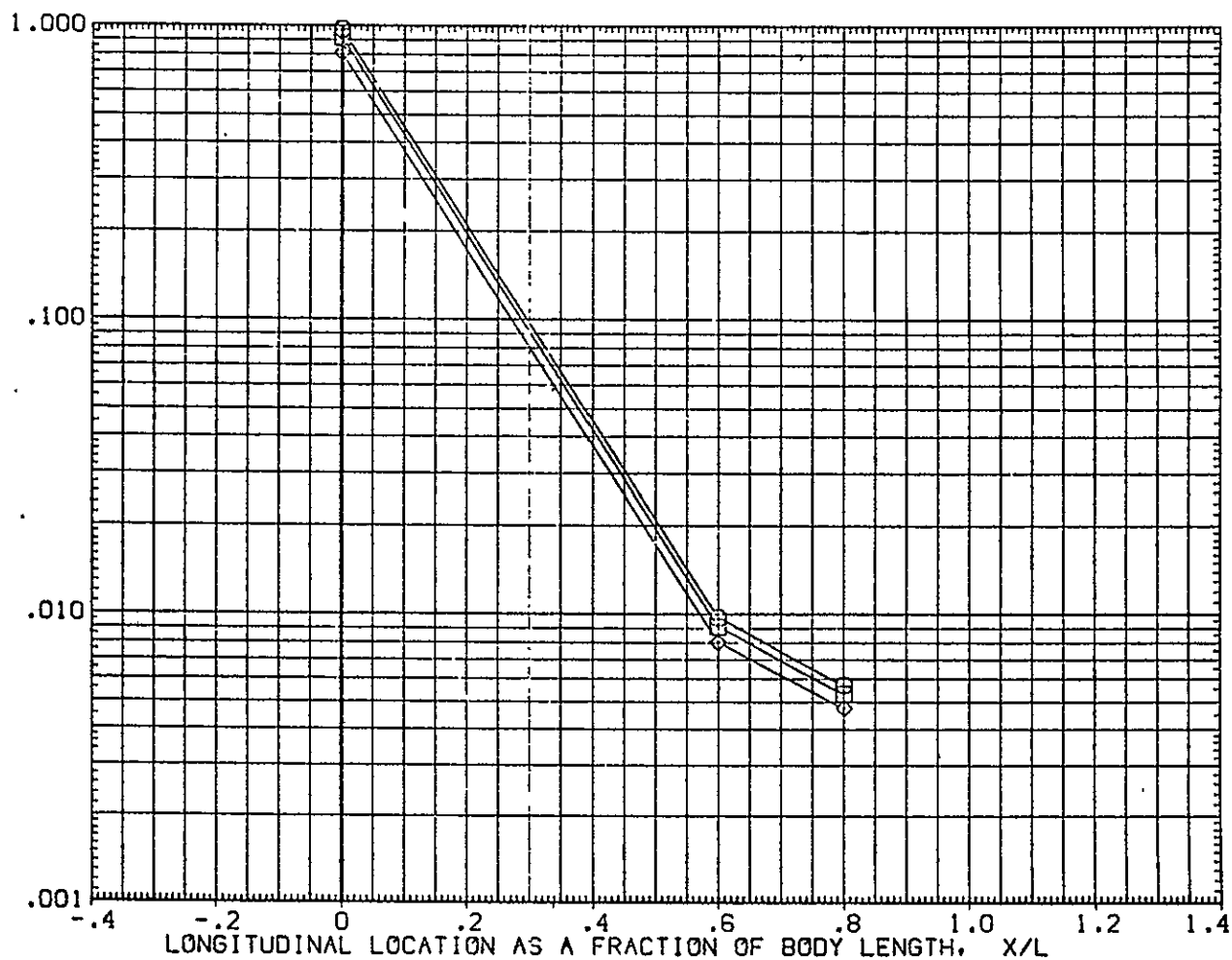


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

0H12/IH21 (CAL HST 173-100) 37 T

TANK

(SUGT01)

SYMBOL
○
□
◇

HAW/HT
.850
.900
1.000

PHI
.000

MACH
18.370

ALPHA

PARAMETRIC VALUES
.000 BETA

.000

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

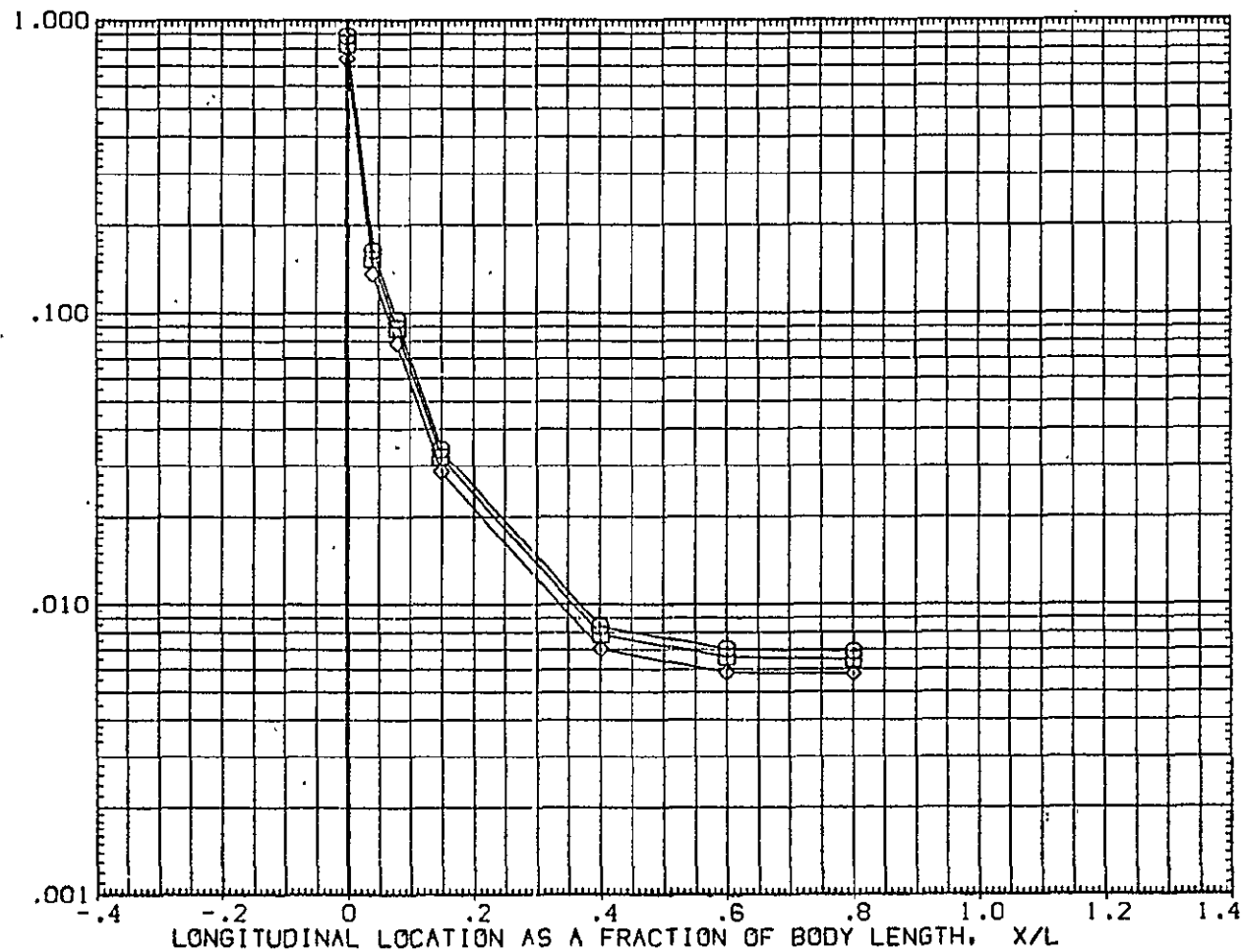


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

CH12/IH21 (CAL HST 173-100) 37 T

TANK (SUGT01)

| SYMBOL | HAW/NT | PHI | MACH | PARAMETRIC VALUES | | |
|--------|--------|---------|--------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| ◇ | .850 | 180.000 | 18.370 | .000 | .000 | .000 |
| □ | .900 | | | | | |
| ○ | 1.000 | | | | | |

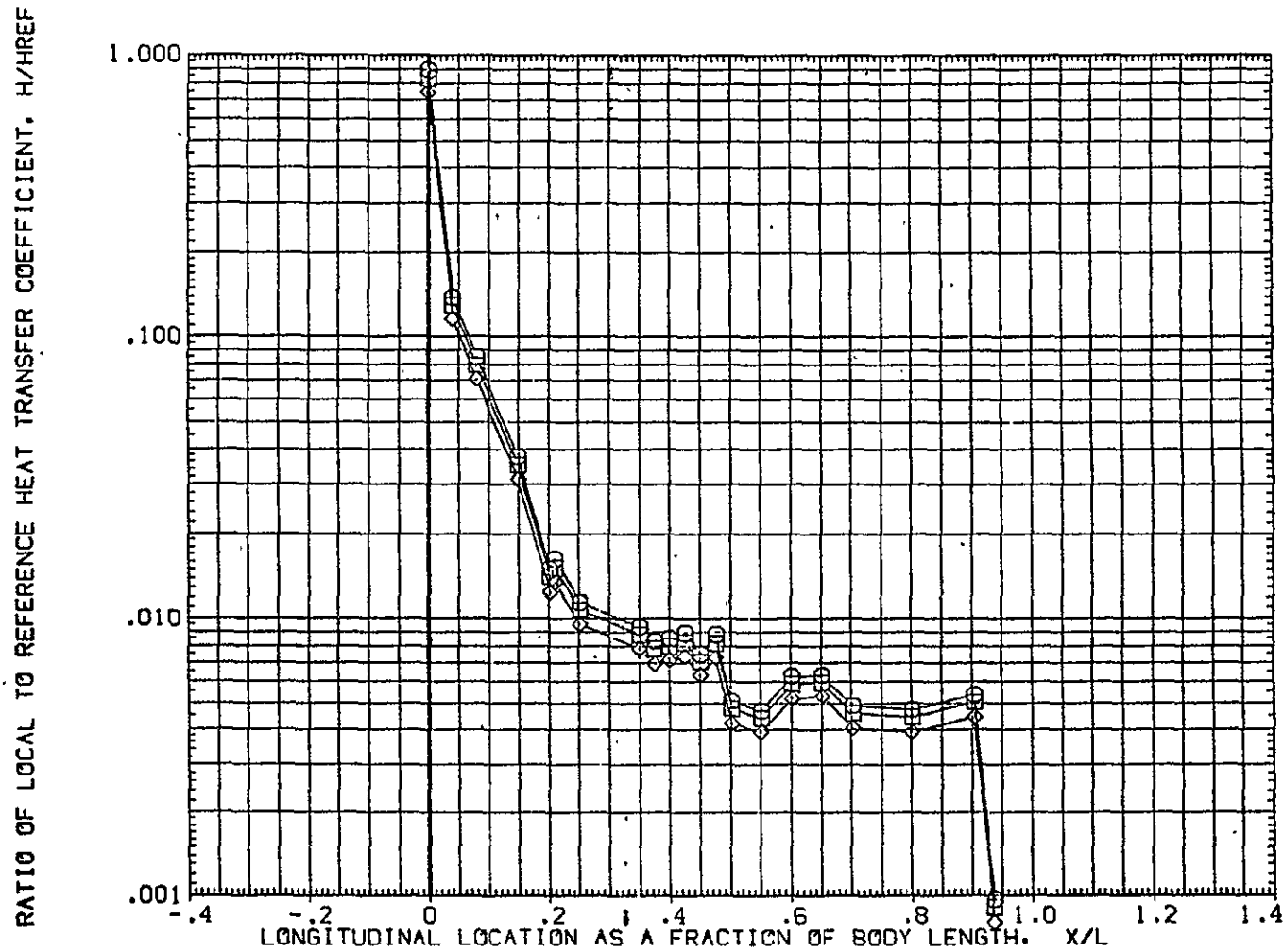


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR

OH12/IH21 (CAL HST 173-100) 37 T TANK (SUGTO1)

| SYMBOL | HAW/HT | PHI | MACH | ALPHA | PARAMETRIC VALUES | |
|--------|--------|---------|--------|-------|-------------------|------|
| ◇ | .850 | 199.000 | 18.370 | .000 | BETA | .000 |
| □ | .900 | | | | | |
| ○ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

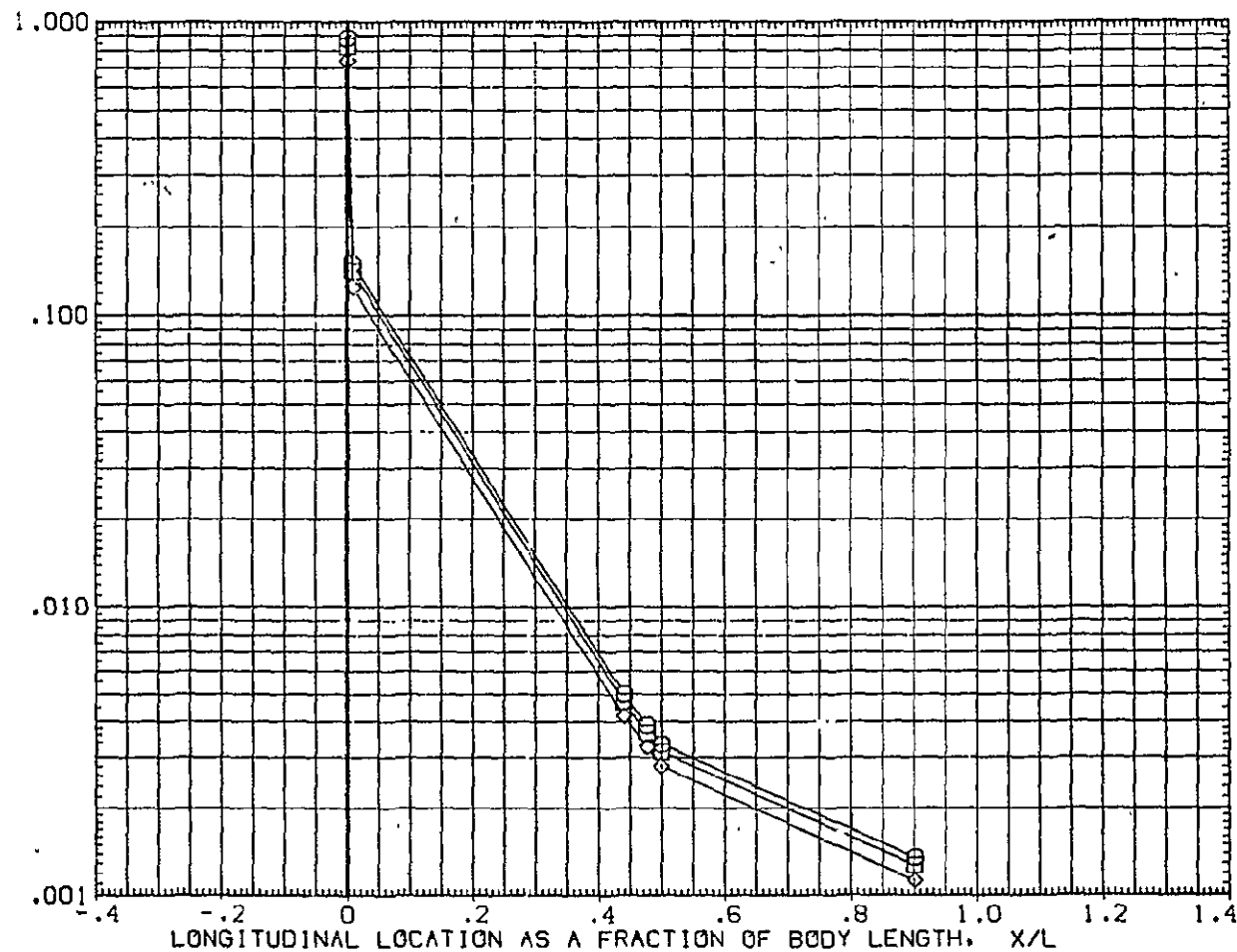


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

OH12/IH21 (CAL HST 173-100) 37 T TANK (SUGTO1)

| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
|--------|--------|---------|--------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| □ | .850 | 221.000 | 18.370 | .000 | .000 | .000 |
| ◇ | .900 | | | | | |
| | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, h/h_{REF}

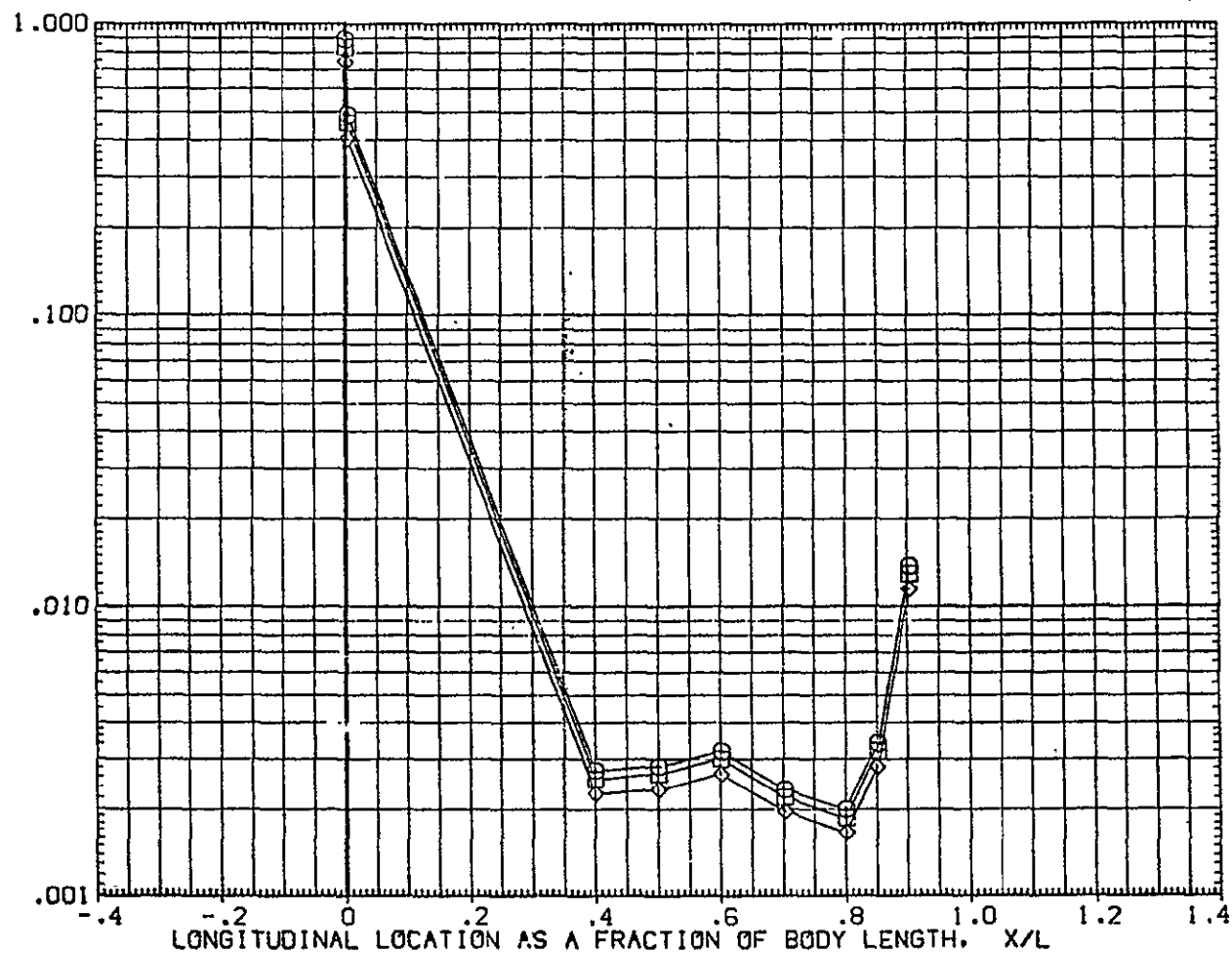


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

OH12/IH21 (CAL HST 173-100) 37 T

TANK (SUGTO1)

| SYMBOL | HAW/HT | PHI | MACH |
|--------|--------|---------|--------|
| ○ | .850 | 241.000 | 18.370 |
| □ | .900 | | |
| ◇ | 1.000 | | |

| PARAMETRIC VALUES | | |
|-------------------|------|------|
| ALPHA | BETA | |
| .000 | | .000 |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

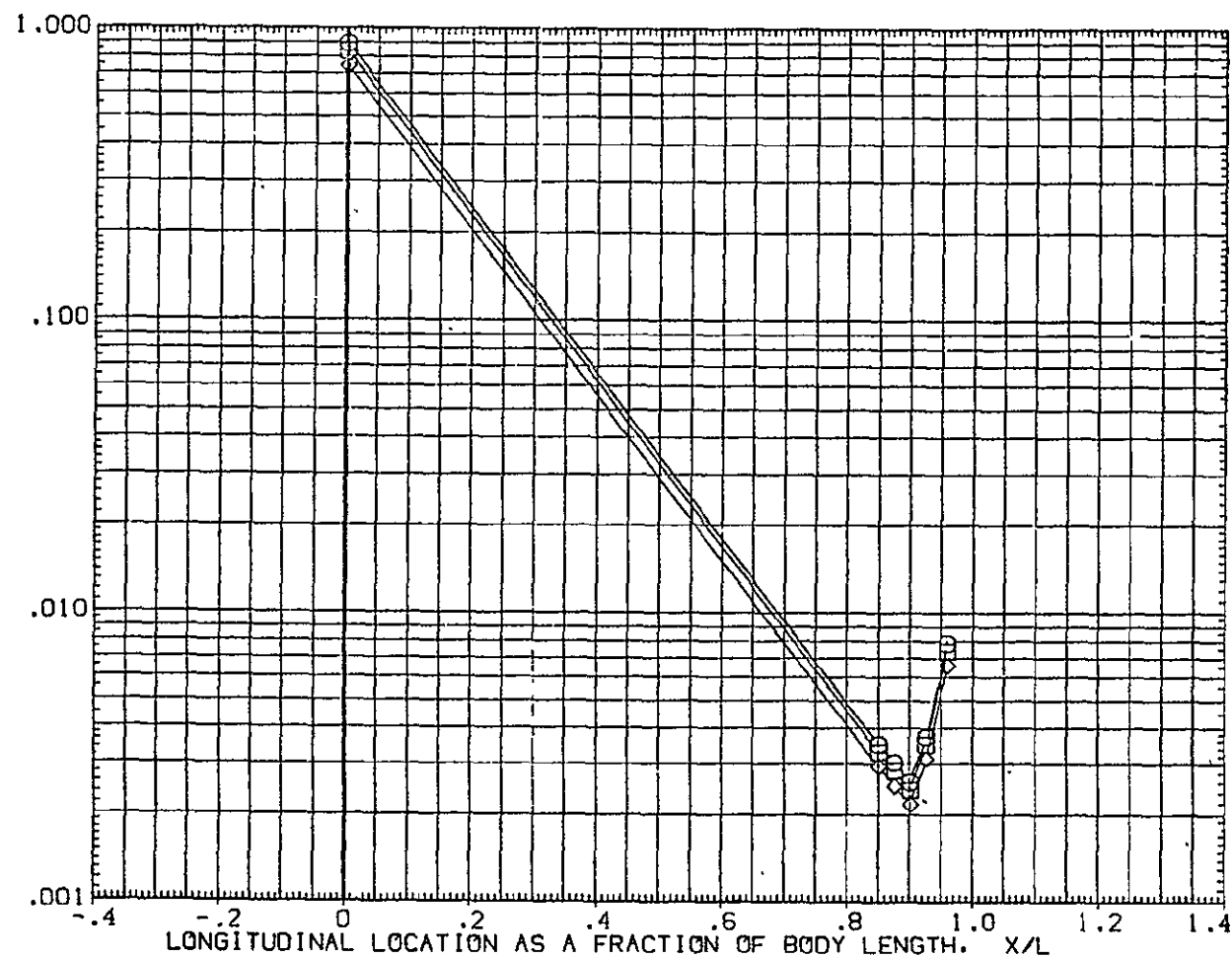


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

OH12/IH21 (CAL HST 173-100) 37 T TANK (SUGT01)

| SYMBOL | HAM/HT | PHI | MACH | PARAMETRIC VALUES | | |
|--------|--------|---------|--------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| ○ | .850 | 247.000 | 18.370 | .000 | .000 | .000 |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

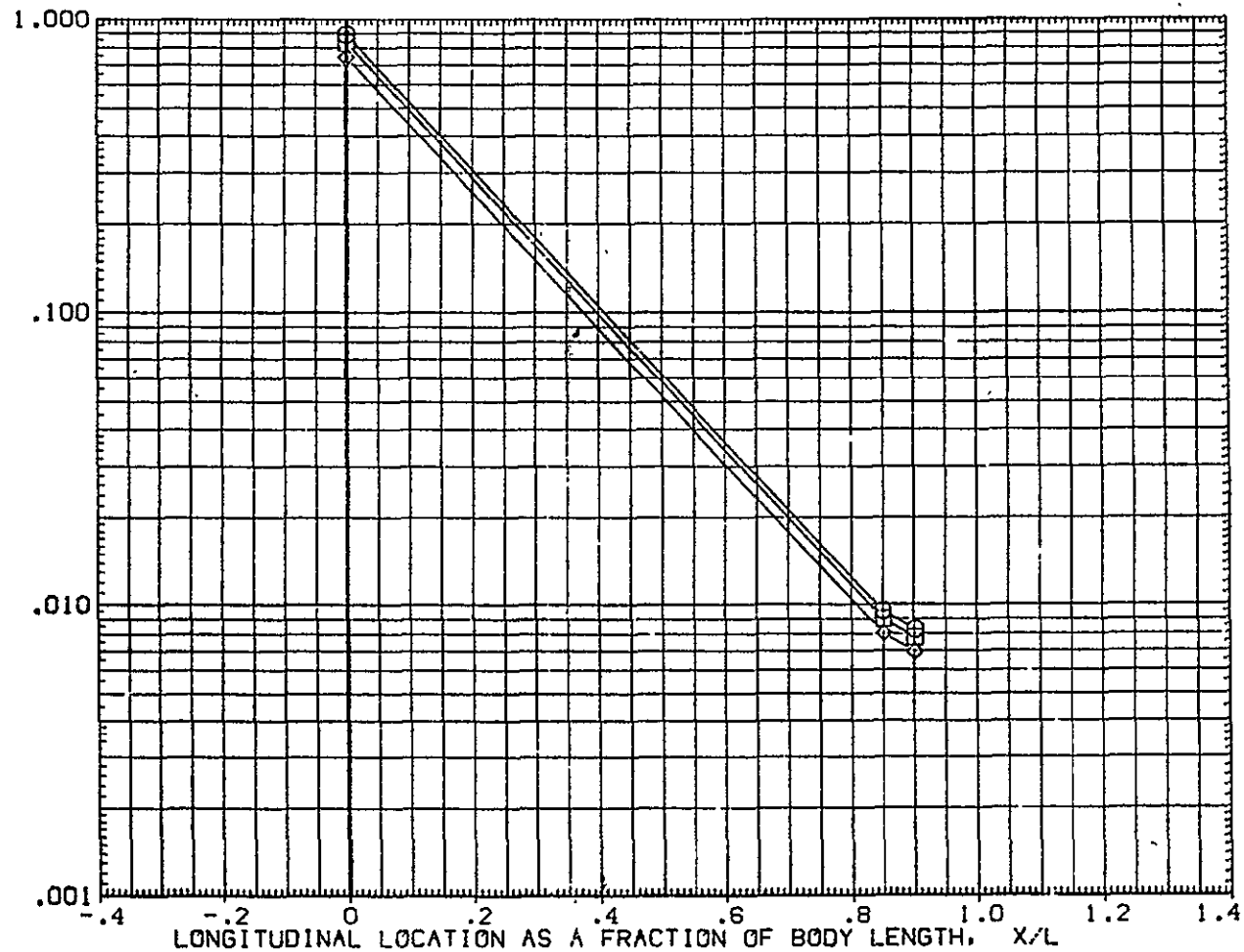


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

0H12/IH21 (CAL HST 173-100) 37 T TANK (SUGT01)

| SYMBOL | HAW/HT | PHI | MACH | ALPHA | BETA |
|--------|--------|---------|--------|-------|------|
| ○ | .850 | 270.000 | 18.370 | .000 | .000 |
| □ | .900 | | | | |
| ◇ | 1.000 | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

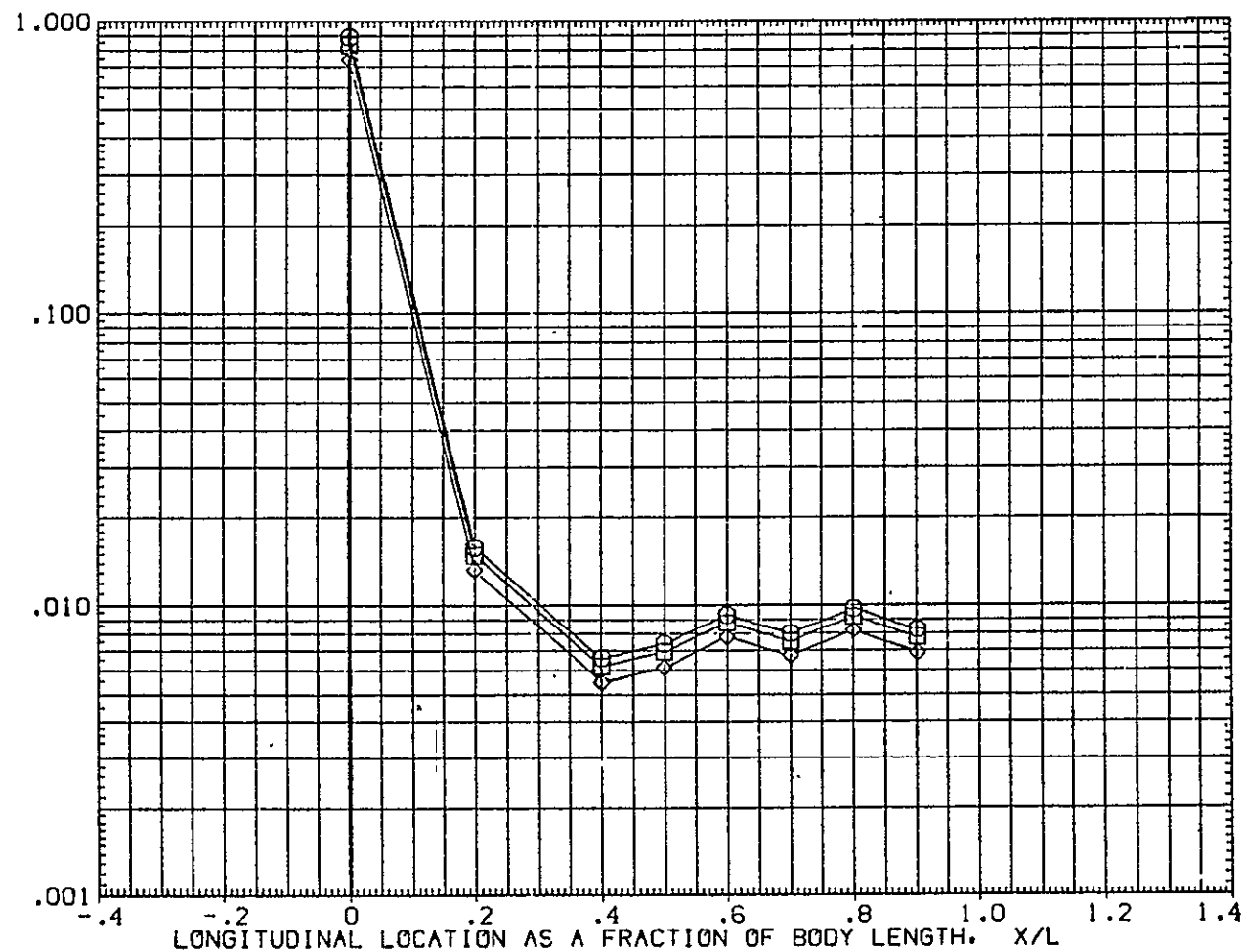


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

0H12/IH21 (CAL HST 173-100) 37 T TANK (SUGT01)

| | | | | | | |
|--------|--------|---------|--------|-------------------|------|-----------|
| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
| ◇ □ □ | .850 | 315.000 | 18.370 | ALPHA | .000 | BETA .000 |
| | .900 | | | | | |
| | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

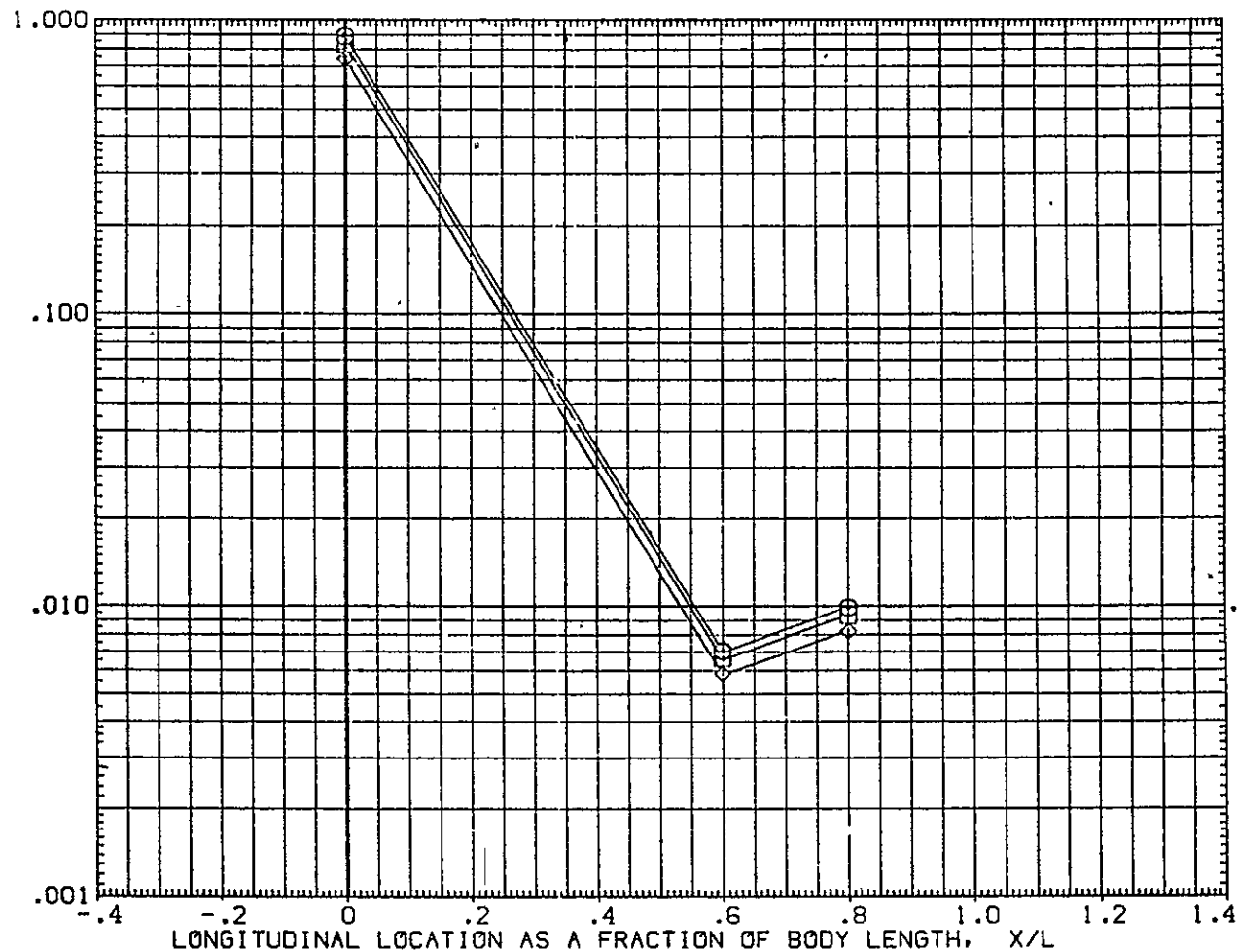


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

OH12/IH21 (CAL HST 173-100) 37 T

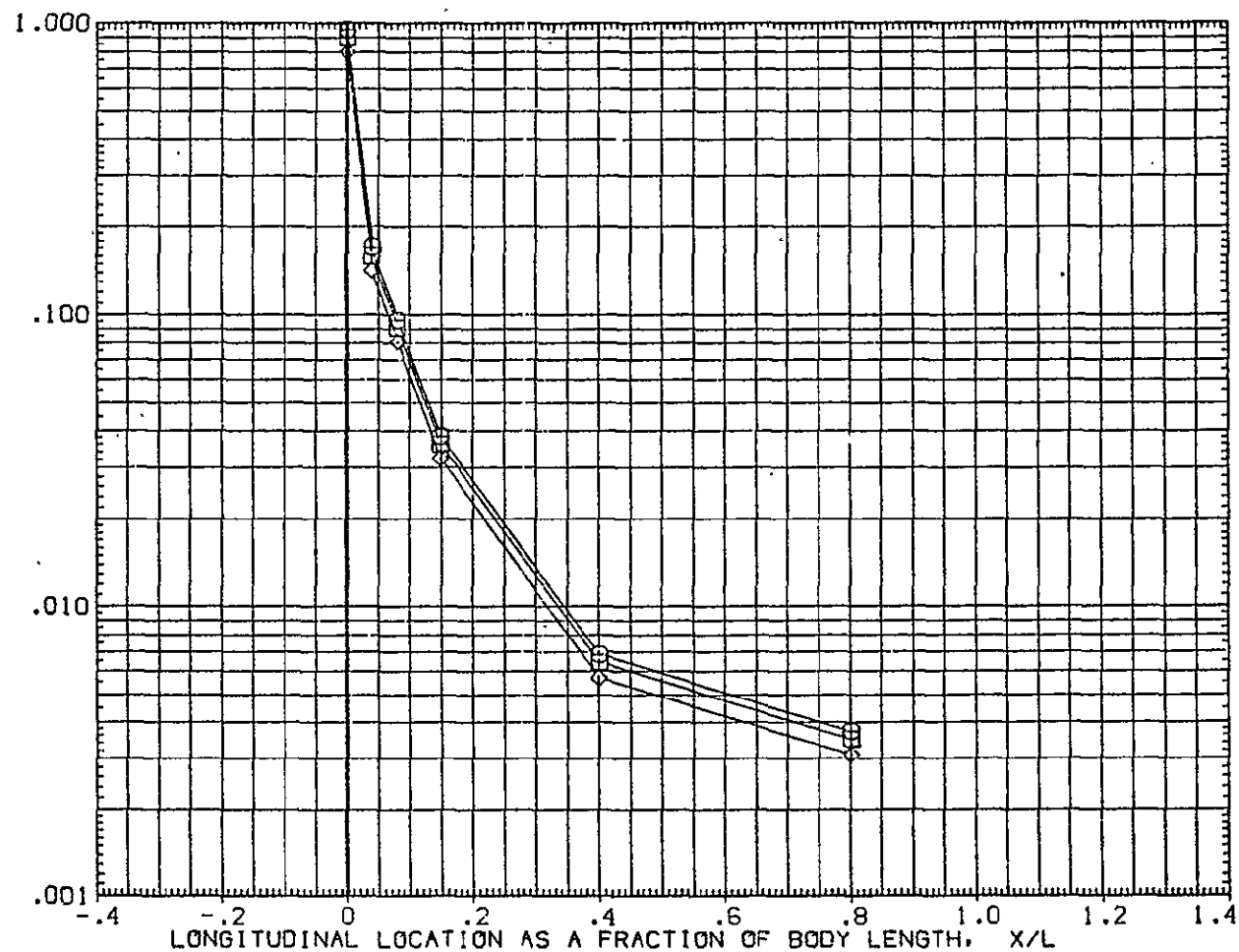
TANK (SUGTO1)

SYMBOL
◇ □ ○HAW/HT
.850
.900
1.000PHI
.000MACH
19.130

ALPHA

PARAMETRIC VALUES
.000 BETA

.000

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF} FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

OH12/IH21 (CAL HST 173-100) 37 T TANK (SUGT01)

| | | | | | | |
|--------|--------|---------|--------|-------|-------------------|------|
| SYMBOL | HAW/HT | PHI | HACH | ALPHA | PARAMETRIC VALUES | |
| ◇ | .850 | 180.000 | 19.130 | .000 | BETA | .000 |
| □ | .900 | | | | | |
| ○ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, h/h_{REF}

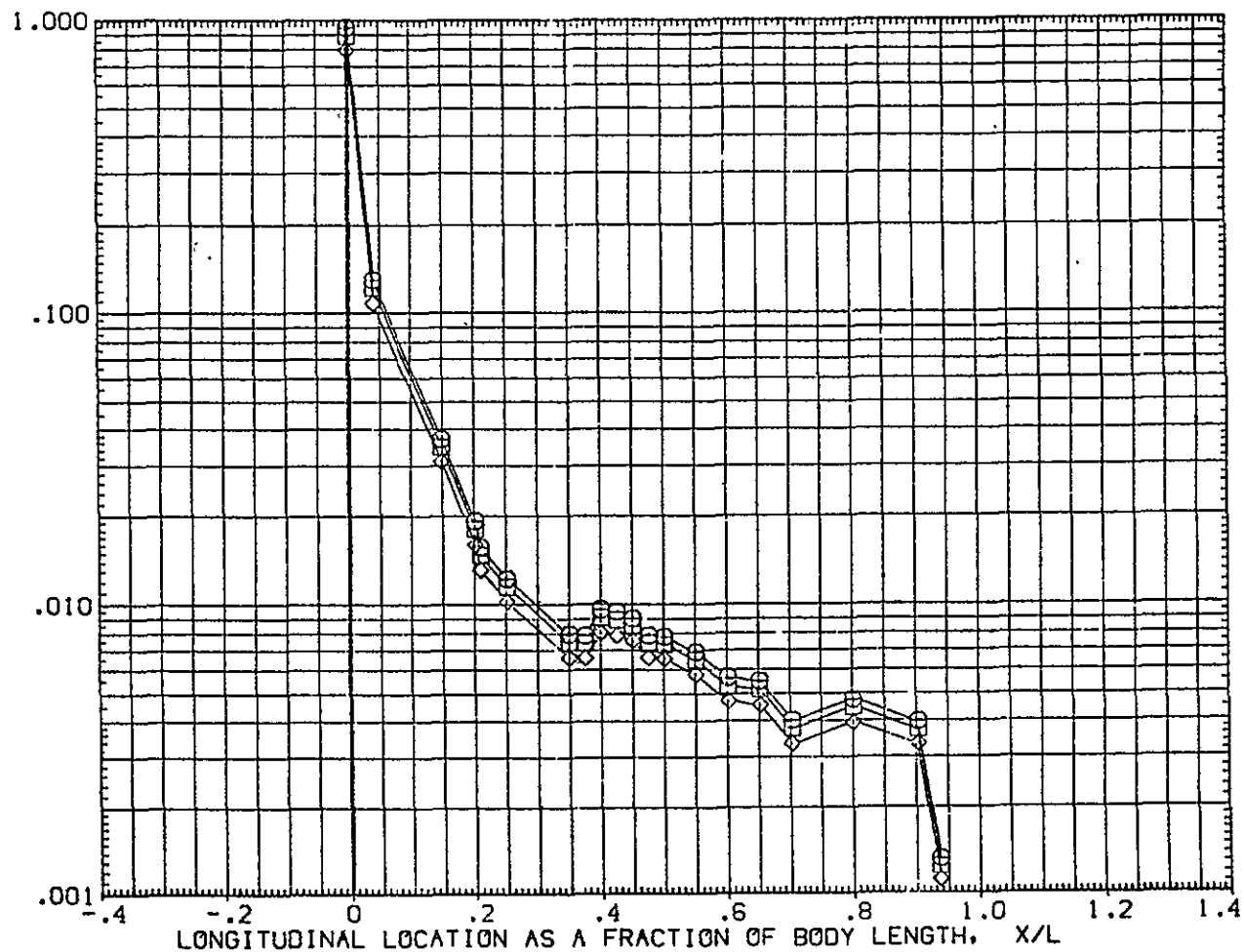


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

0H12/IH2! (CAL HST I73-100) 37 T TANK (SUGT01)

| SYMBOL | HAW/HT | PHI | PACH | ALPHA | PARAMETRIC VALUES | | BETA | |
|--------|--------|---------|--------|-------|-------------------|--|------|------|
| ◇ | .850 | 199.000 | 19.130 | | .000 | | | .000 |
| □ | .900 | | | | | | | |
| ○ | 1.000 | | | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT: H/H_{REF}

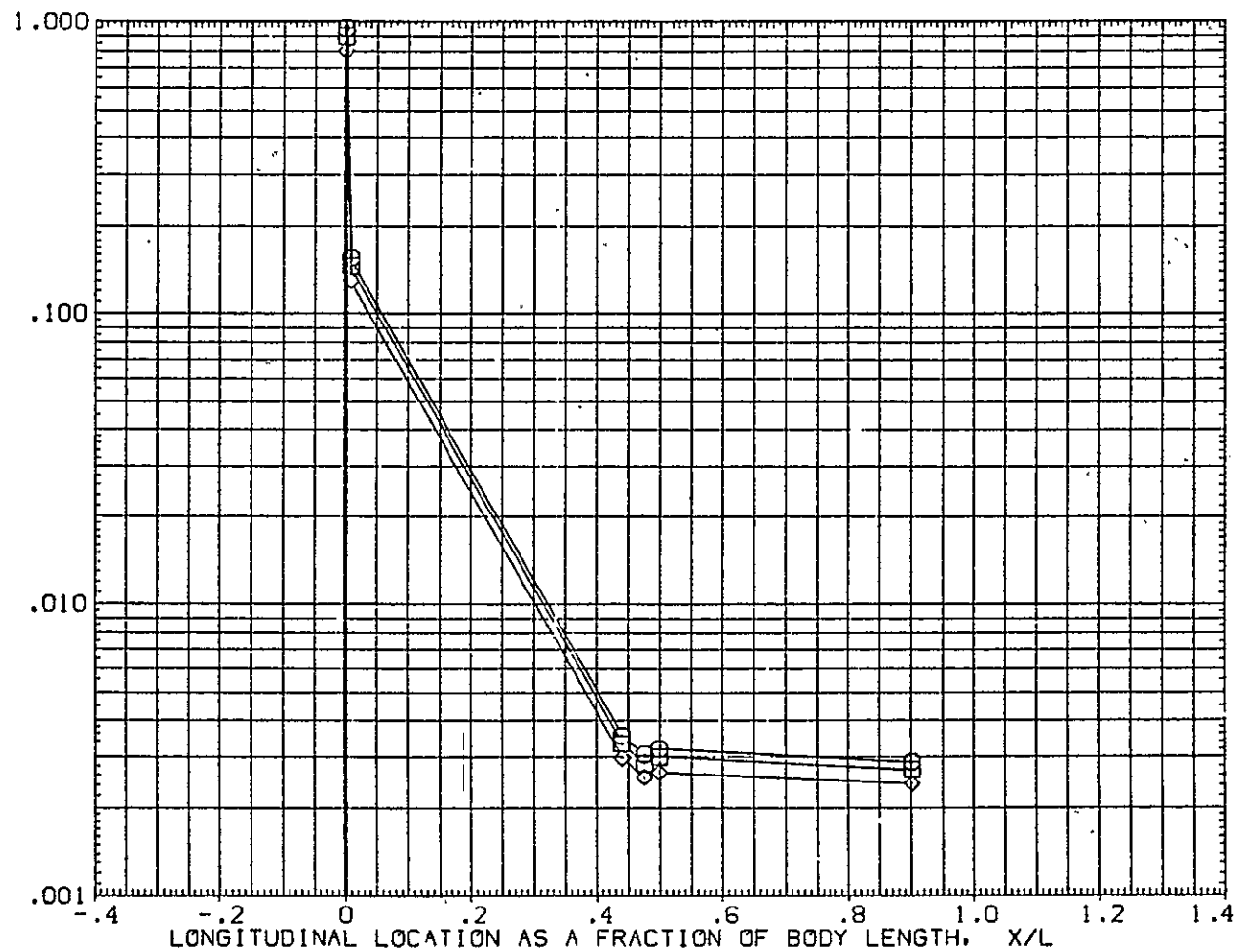


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ $\alpha = 0$

OH12/IH21 (CAL HST 173-100) 37 T

TANK

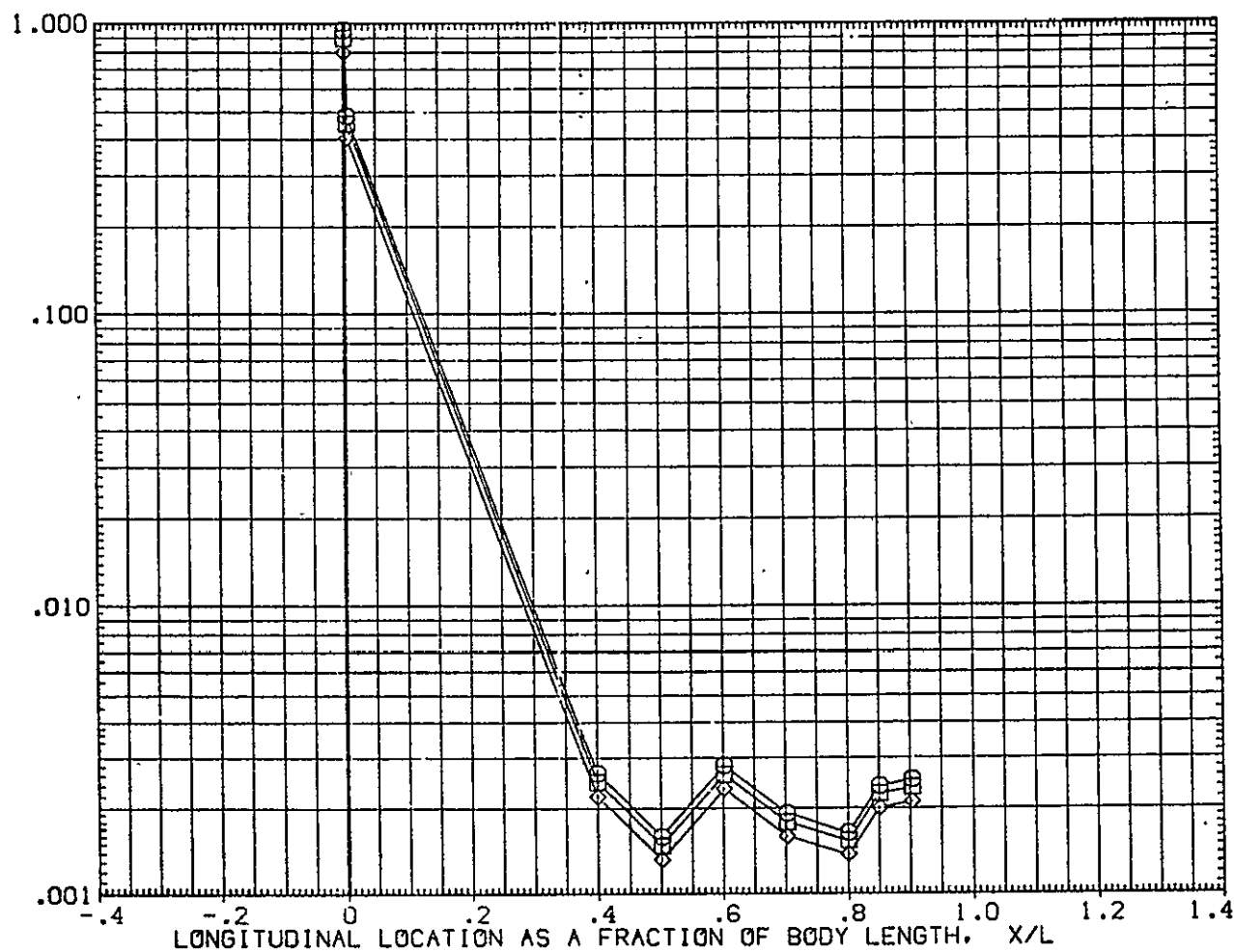
(SUGT01)

SYMBOL
◇ □ ○HAW/HT
.850
.900
1.000PHI
221.000MACH
19.130

ALPHA

PARAMETRIC VALUES
.000 BETA

.000

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, h/h_{REF} FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR

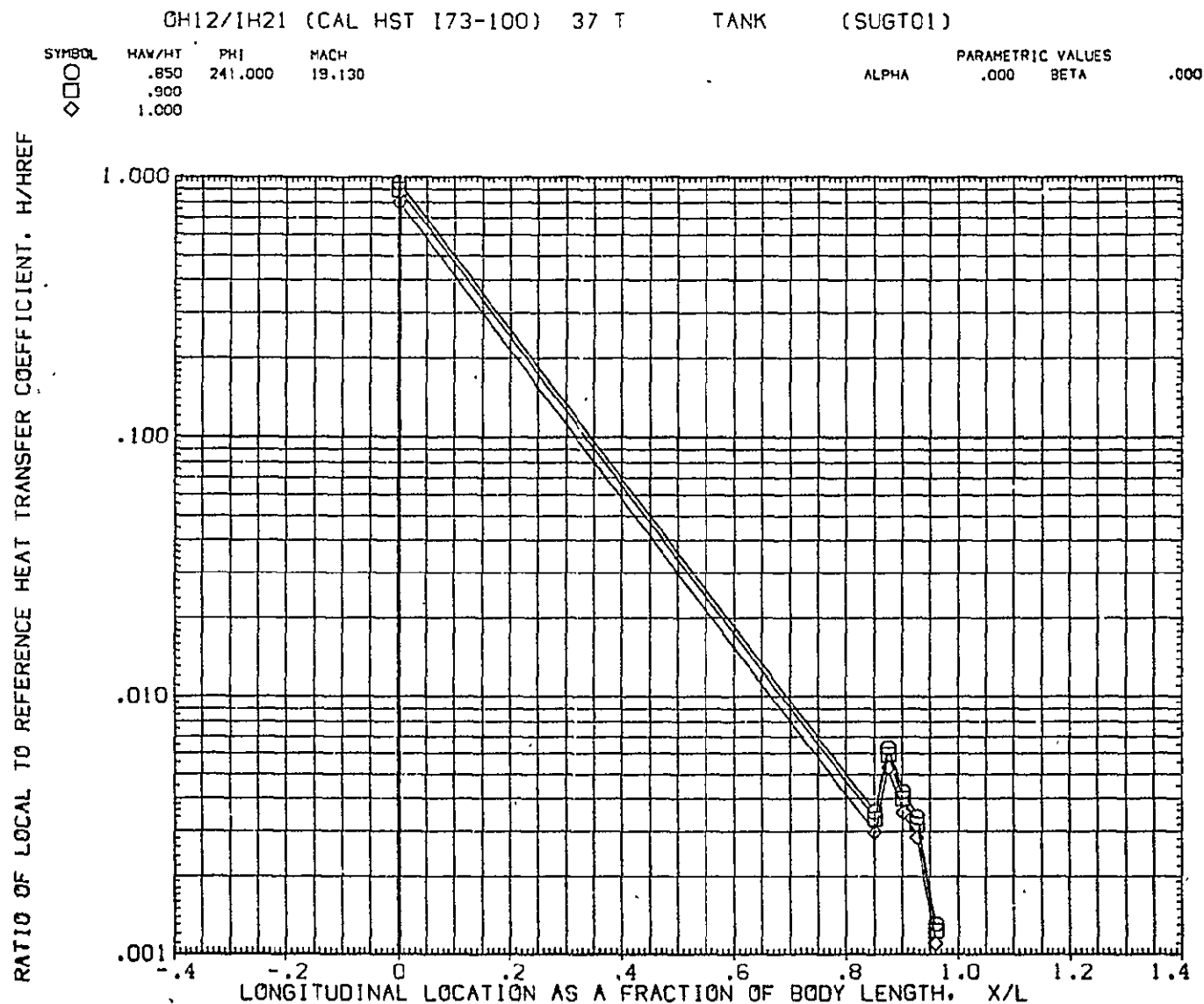


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER RN/L ALPHA = 0

0H12/IH21 (CAL HST 173-100) 37 T

TANK

(SUGT01)

SYMBOL

HAW/HT

PHI

MACH

PARAMETRIC VALUES

ALPHA

BETA

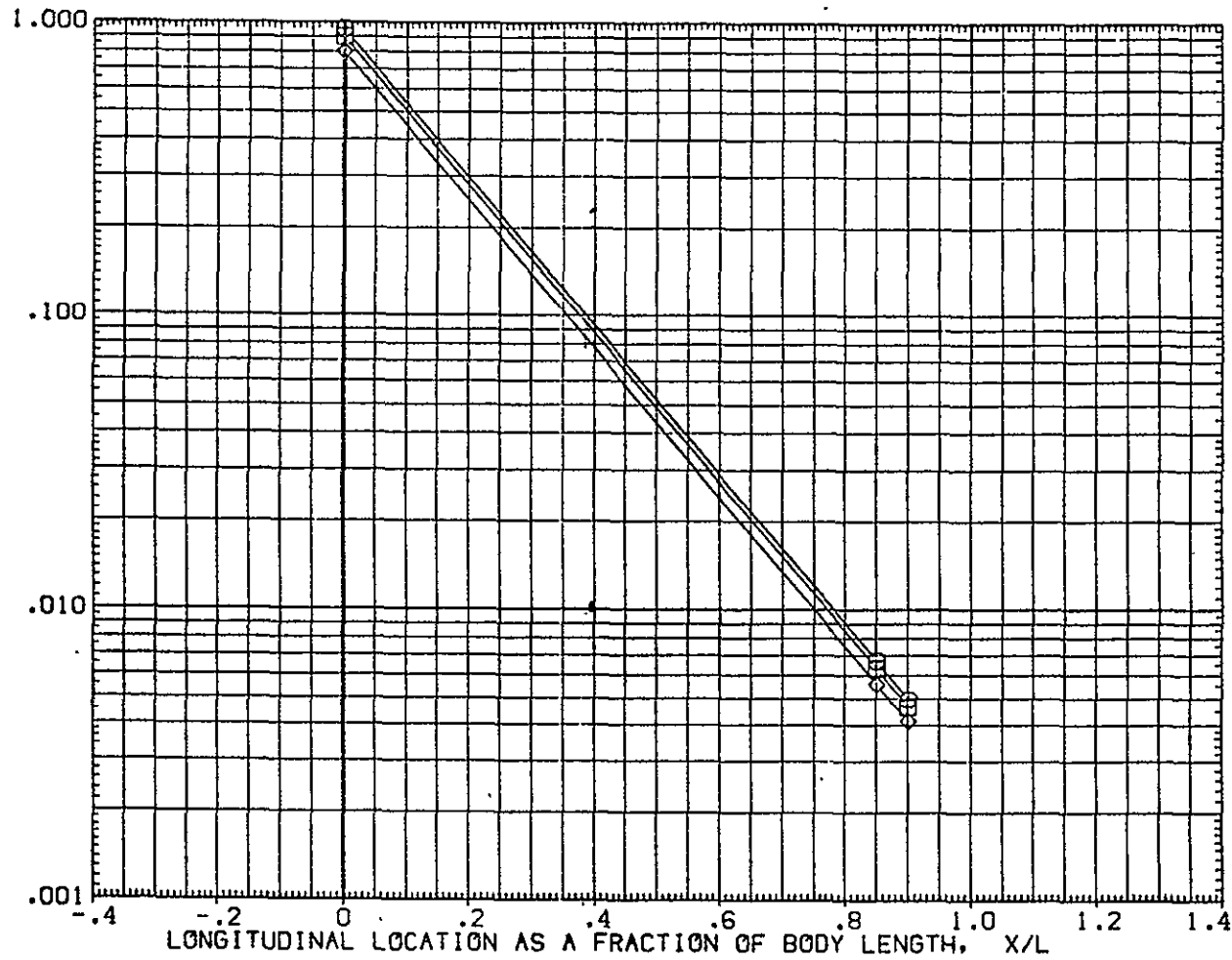
.000

\square
 \square
 \diamond

.850
 .900
 1.000

247.000

19.130

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, h/h_{REF} FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER RN/LI $\alpha = 0$

0H12/IH21 (CAL HST 173-100) 37 T

TANK

(SUGT01)

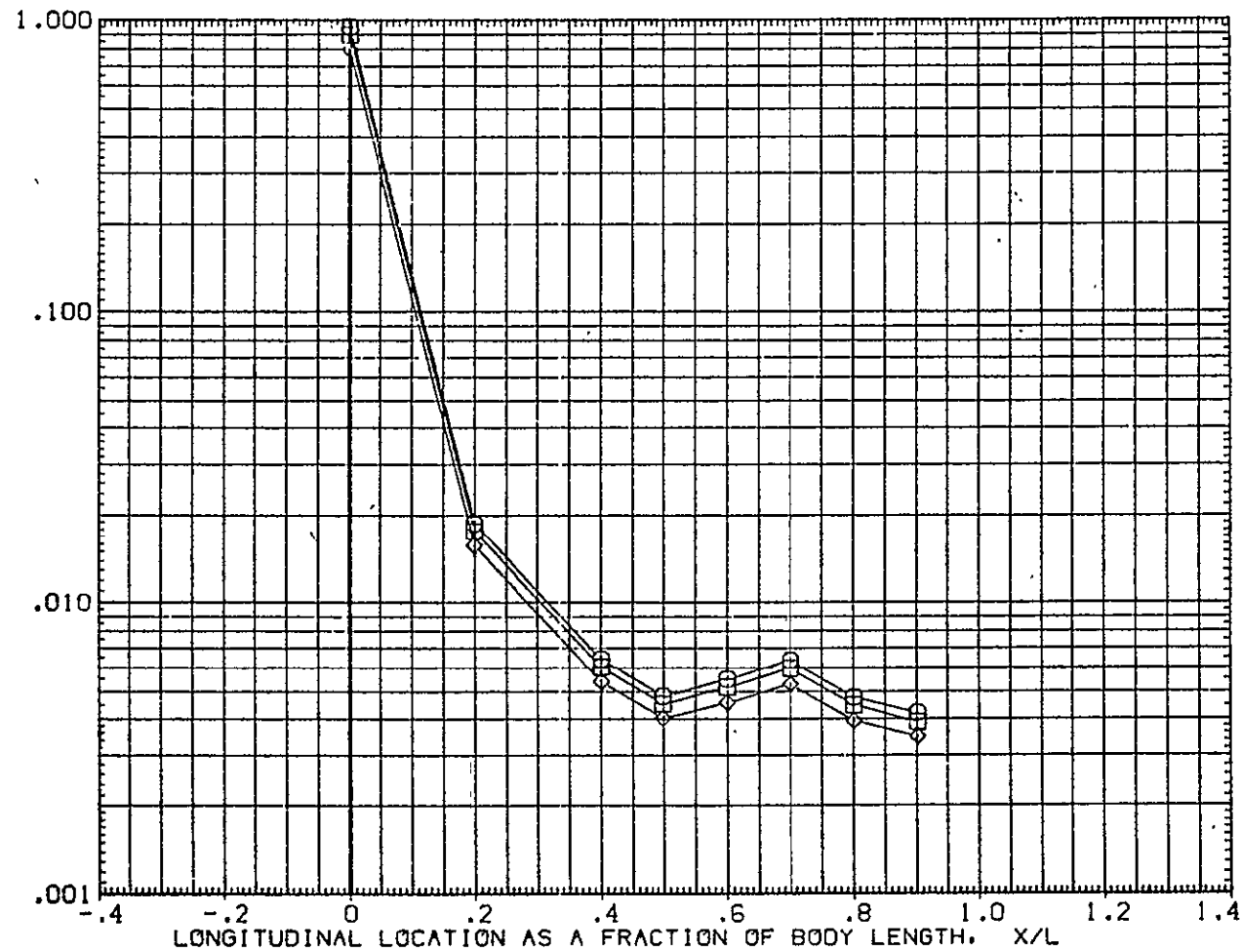
SYMBOL
○
□
◇HAW/HT
.850
.900
1.000PHI
270.000MACH
19.130

ALPHA

PARAMETRIC VALUES

.000 BETA

.000

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF} FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

CH12/1H21 (CAL HST 173-100) 37 T TANK (SUGT01)

| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
|--------|--------|---------|--------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| ○ | .650 | 315.000 | 19.130 | .000 | | .000 |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

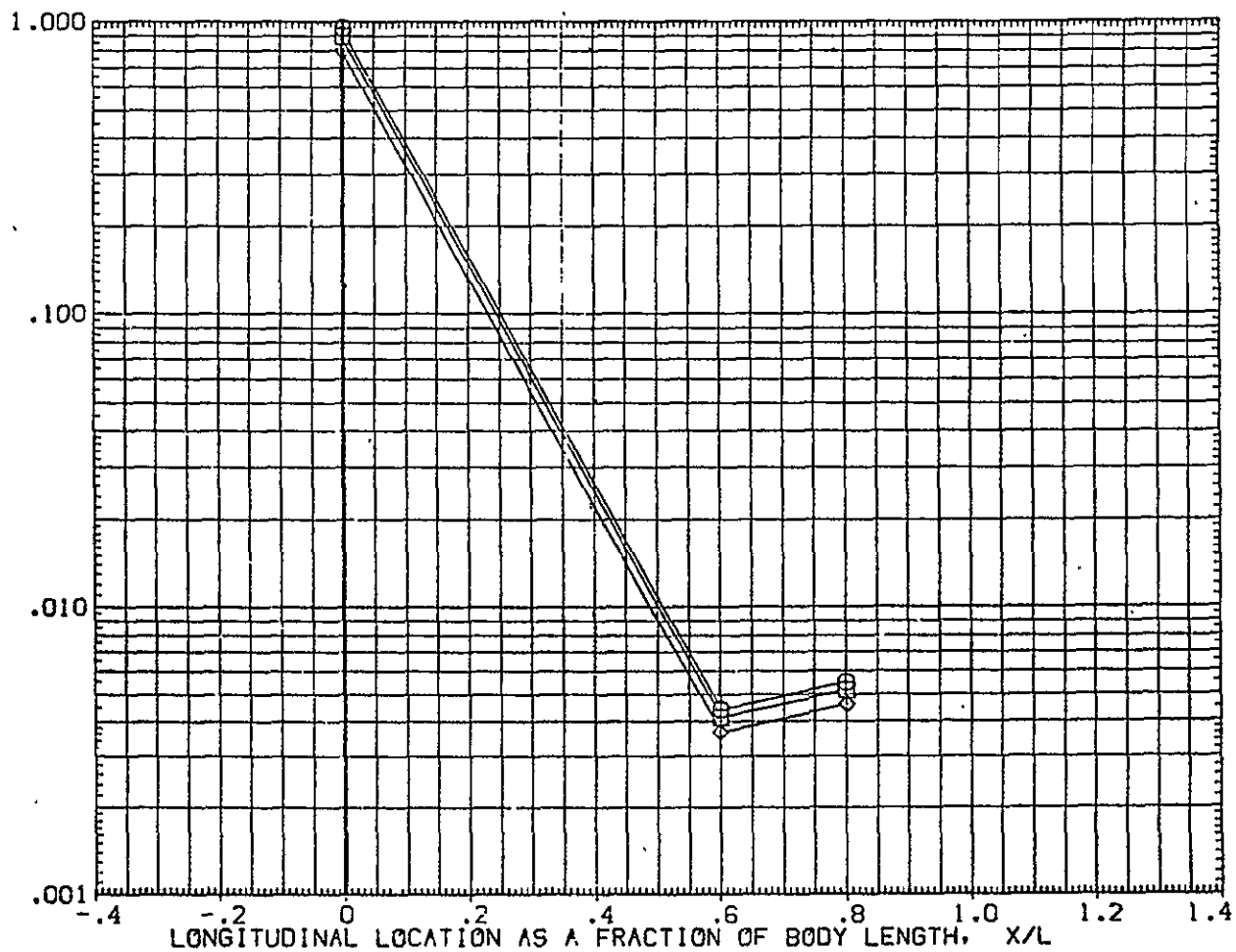


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

OH12/[H2] (CAL HST 173-100) 37 0 T TANK (RUGT05)

| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
|--------|--------|------|-------|-------------------|------|--|
| | | | | ALPHA | BETA | |
| □ | .850 | .000 | 7.010 | .000 | | |
| ◇ | .900 | | | | | |
| | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

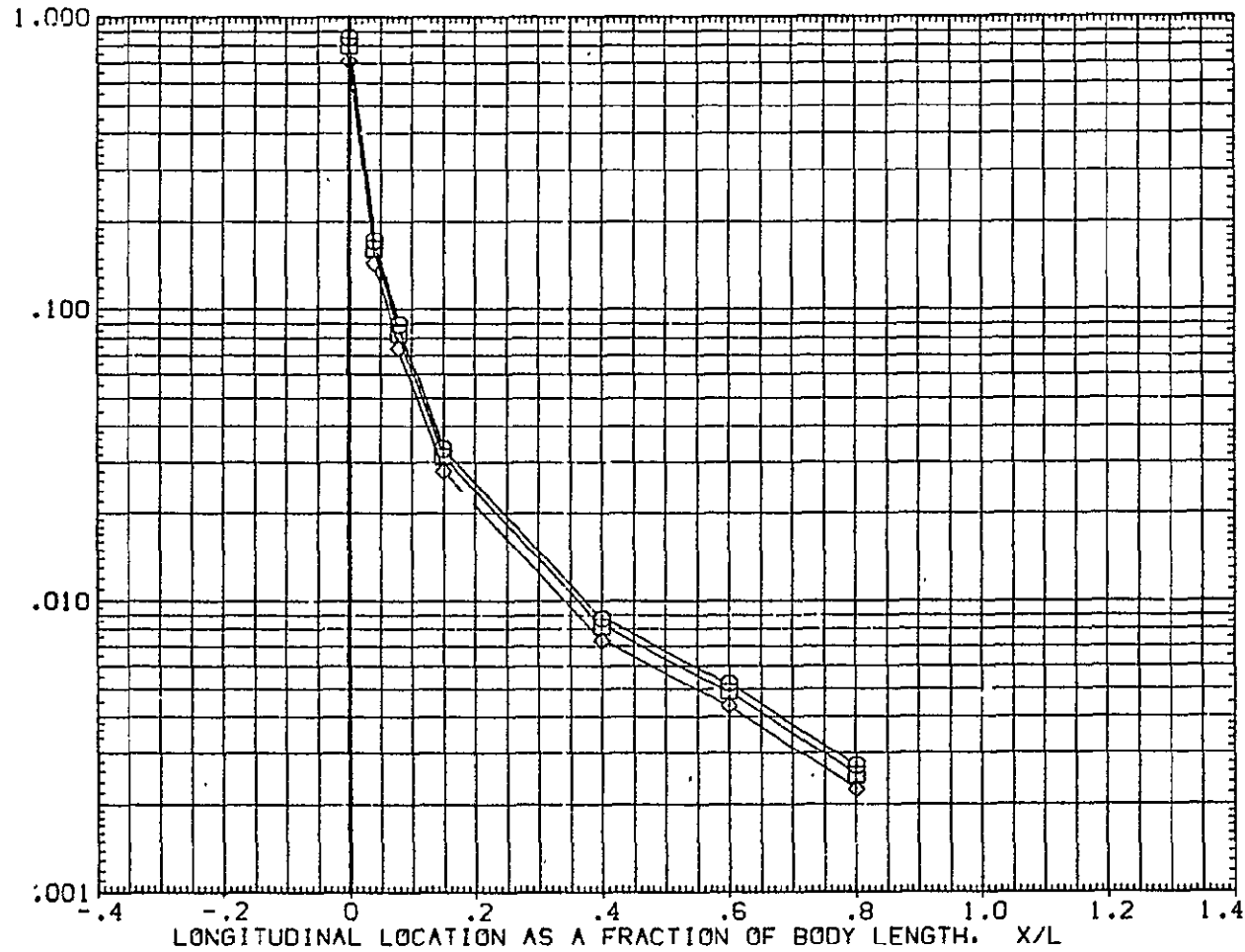


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

2

OH12/1H21 (CAL HST 173-100) 37 0 T TANK (RUGT05)

| | | | | | | |
|--------|--------|---------|-------|-------------------|------|------|
| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
| ◇ | .850 | 180.000 | 7.010 | ALPHA | .000 | BETA |
| □ | .900 | | | | | .000 |
| ◇ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

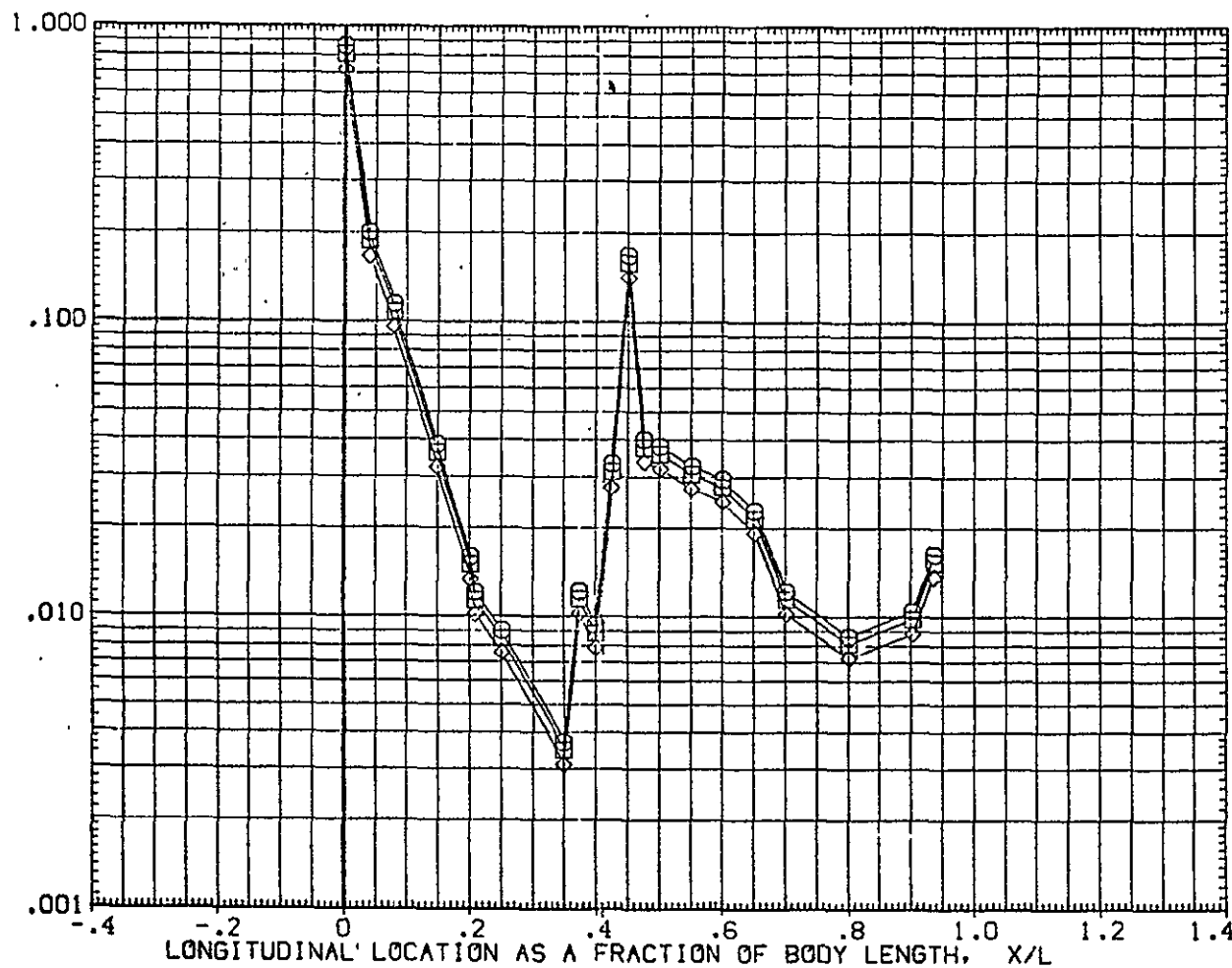


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

OH12/1H21 (CAL HST 173-100) 37 0 T TANK (RUGT05)

| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
|--------|--------|---------|-------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| ○ | .850 | 199.000 | 7.010 | .000 | .000 | .000 |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

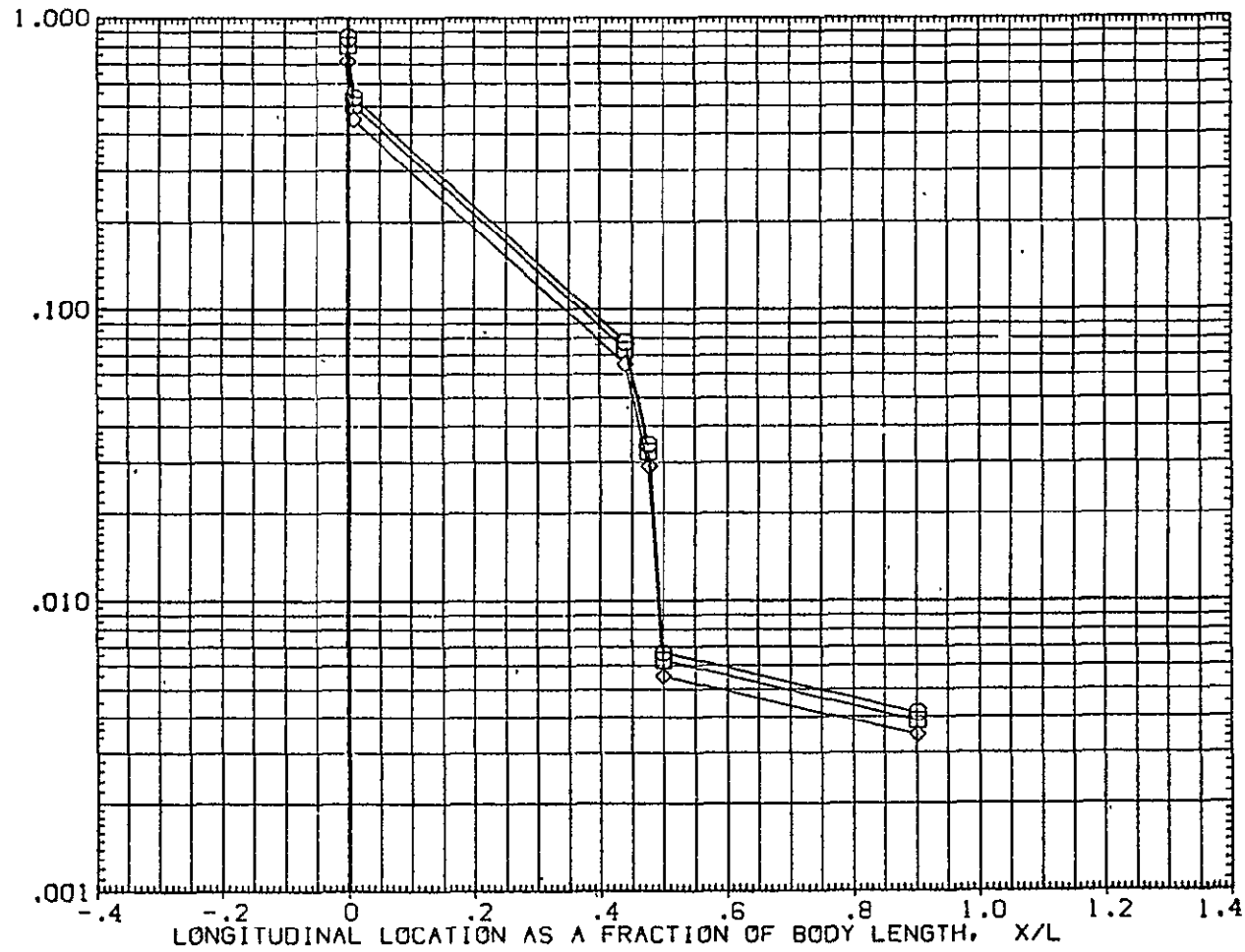


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER RN/L_1 ALPHA = 0

CH12/1P21 (CAL HST 173-100) 37 C T TANK (RUGT05)

| SYMBOL | HAW/WT | PHI | MACH | PARAMETRIC VALUES | | |
|--------|--------|---------|-------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| ◇ | .850 | 221.000 | 7.010 | .000 | | .000 |
| □ | .900 | | | | | |
| ○ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, h/h_{REF}

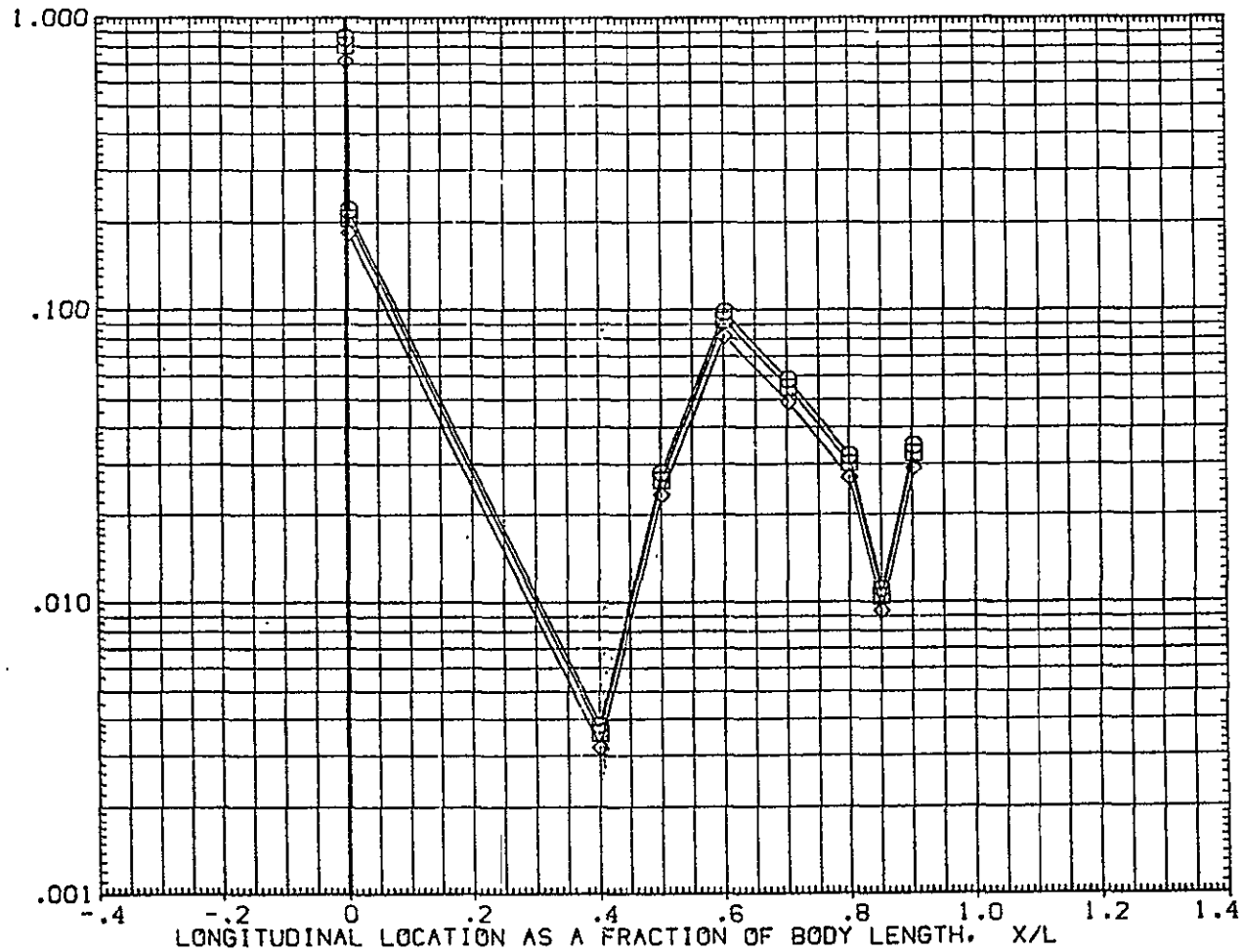


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

0H12/1H21 (CAL HST 173-100) 37 0 T TANK (RUGT05)

| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES |
|--------|--------|---------|-------|----------------------|
| ◇ | .850 | 241.000 | 7.010 | ALPHA .000 BETA .000 |
| □ | .900 | | | |
| ○ | 1.000 | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

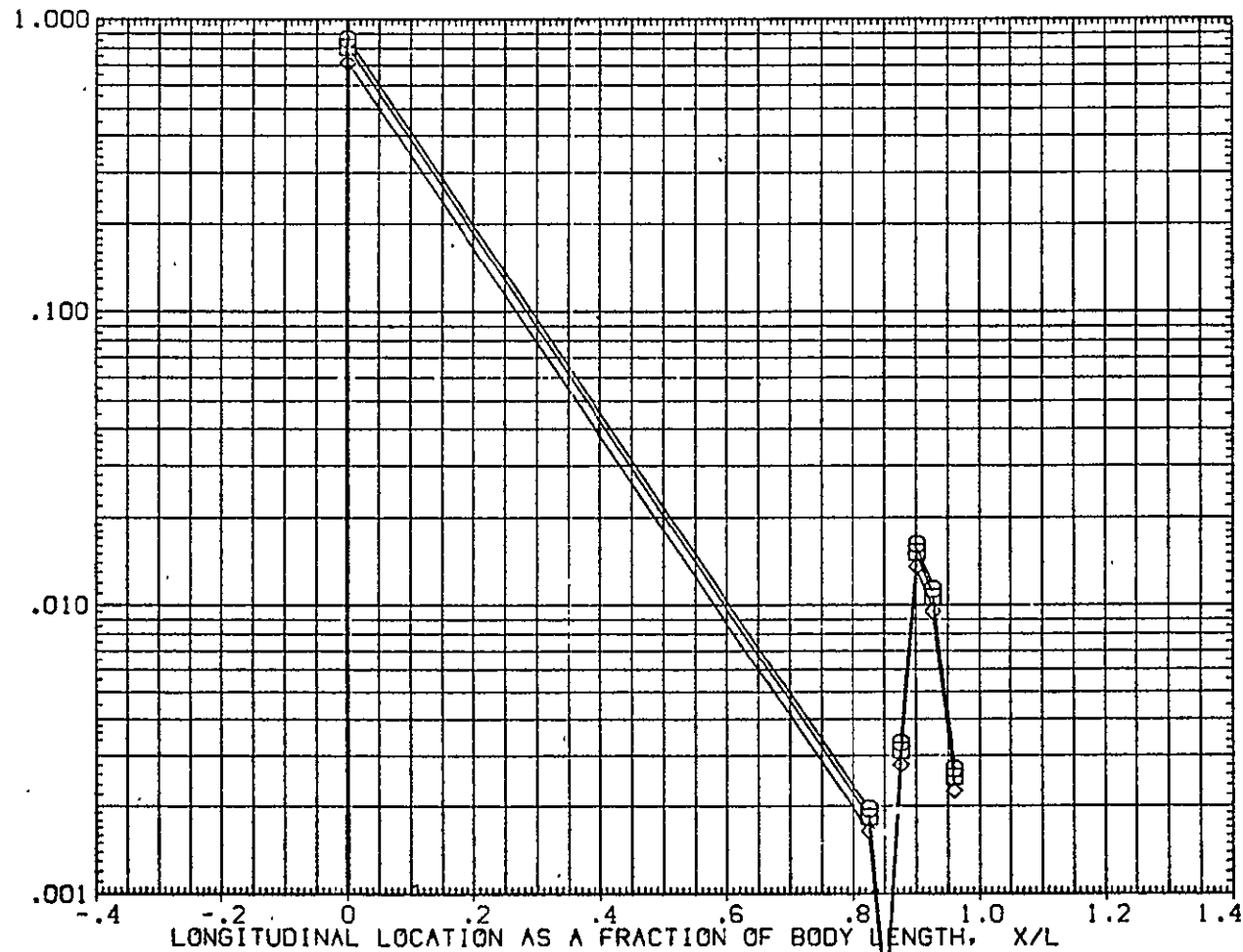


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

OH12/1H21 (CAL HST 173-100) 37 C T TANK (RUGT05)

| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
|--------|--------|---------|-------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| ◇ | .850 | 247.030 | 7.010 | .000 | .000 | .000 |
| □ | .900 | | | | | |
| ○ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, h/h_{REF}

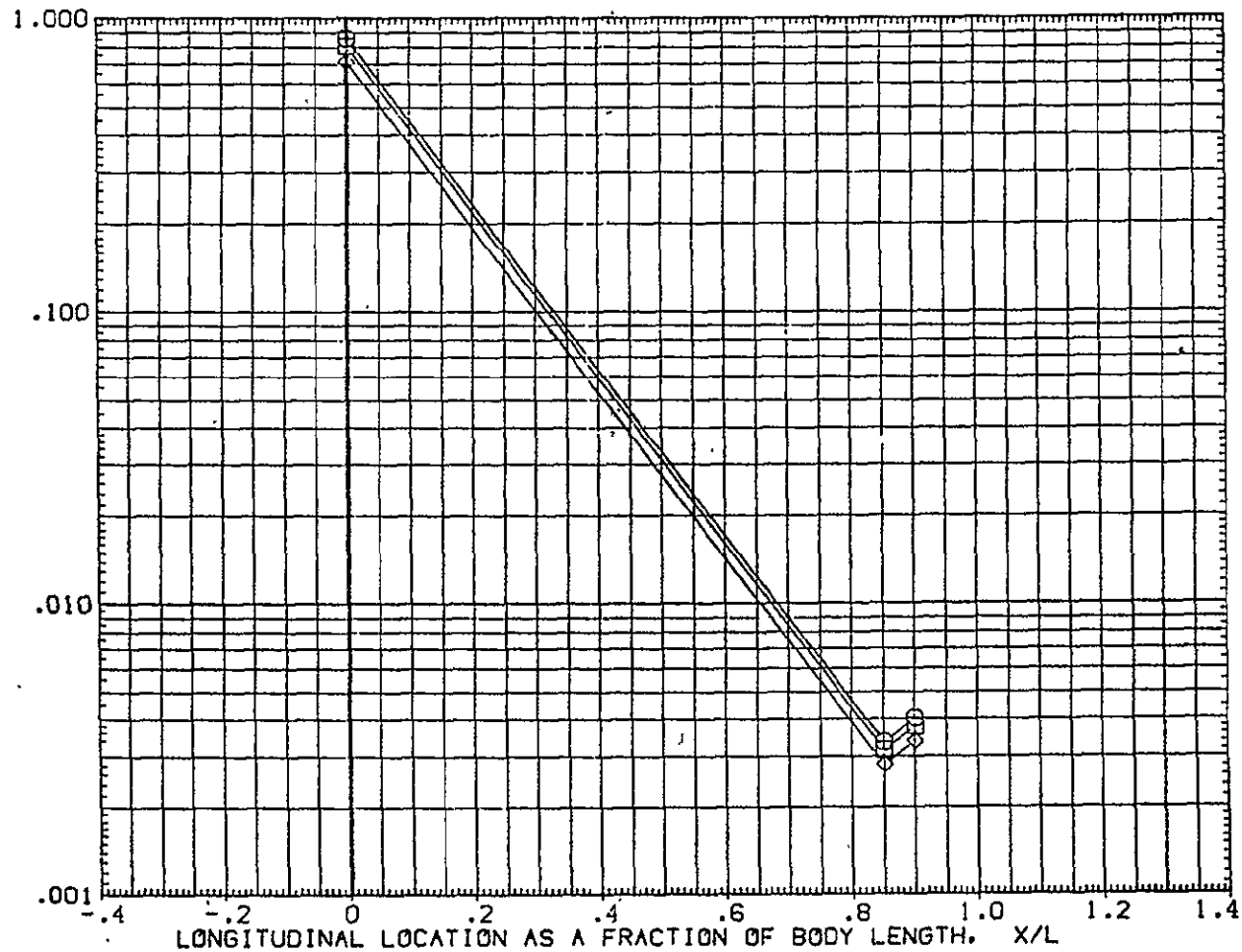


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

OH12/IH21 (CAL HST 173-100) 3" 0 T TANK (RUGT05)

| | | | | | | |
|--------|--------|---------|-------|-------------------|------|-----------|
| SYMBOL | HAV/HT | PHI | MACH | PARAMETRIC VALUES | | |
| ○ | .850 | 270.000 | 7.010 | ALPHA | .000 | BETA .000 |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

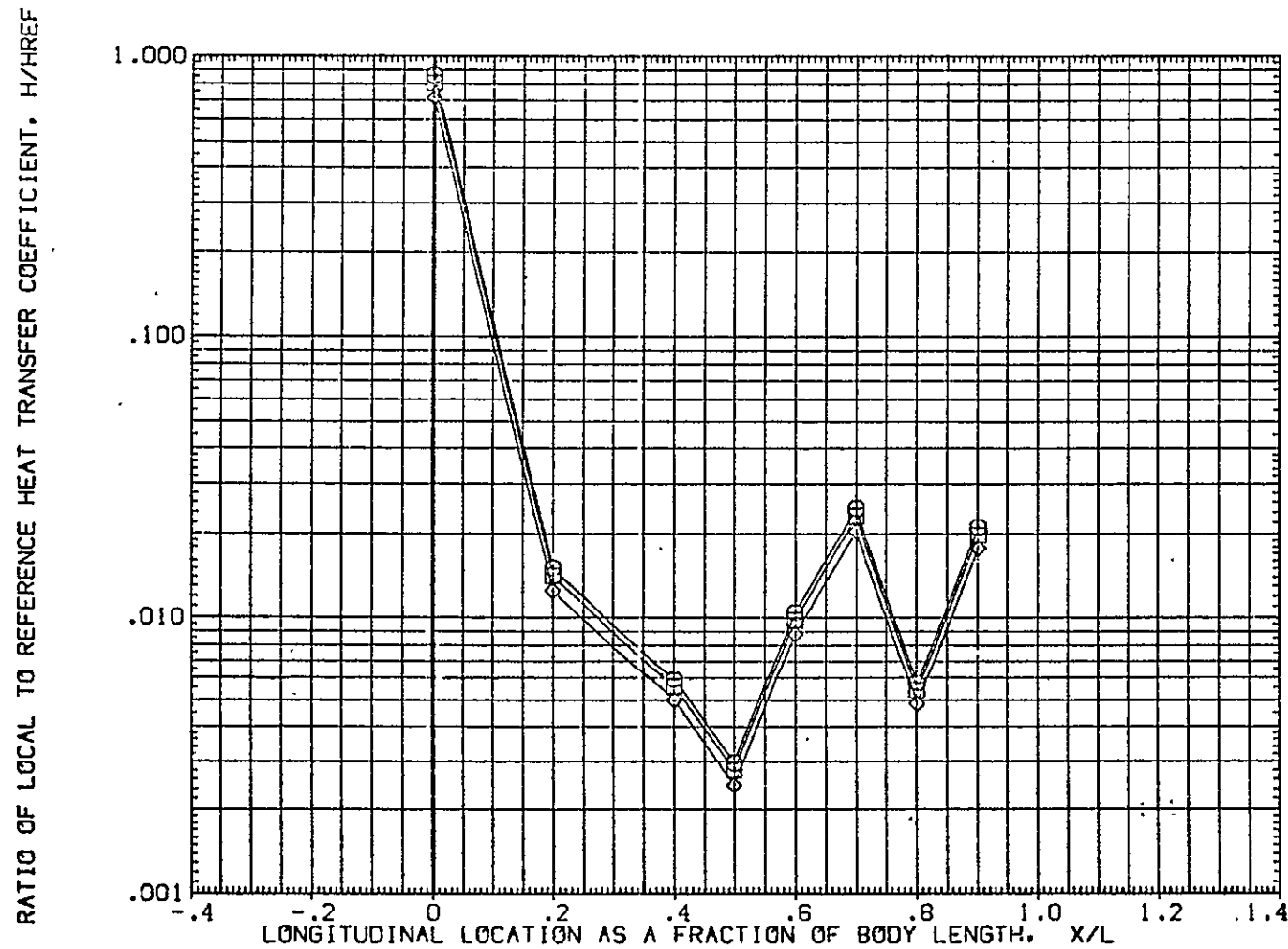


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

CH12/IH21 (CAL HST 173-100) 37 G T TANK (RUGT05)

| SYMBOL | HAW/HT | PHI | MACH | ALPHA | PARAMETRIC VALUES | |
|--------|--------|---------|-------|-------|-------------------|------|
| ◇ | .850 | 315.000 | 7.010 | .000 | BETA | .000 |
| □ | .900 | | | | | |
| ○ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, h/h_{REF}

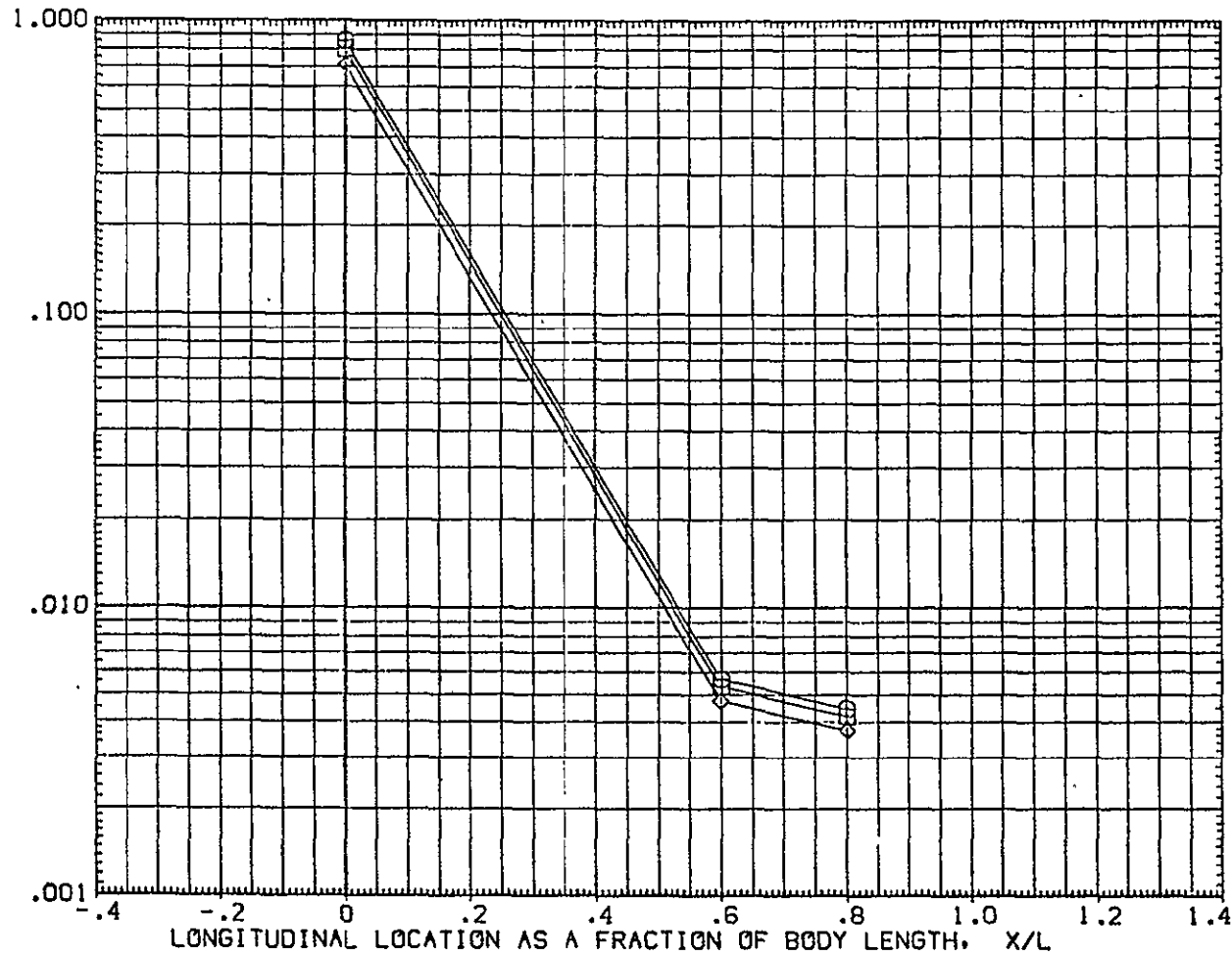


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ $\alpha = 0$

OH12/1H21 (CAL HST 173-100) 37 0 T TANK (RUGT05)

| | | | | | | |
|--------|--------|------|-------|-------------------|------|------|
| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
| ○ | .850 | .000 | 7.617 | ALPHA | .000 | BETA |
| □ | .900 | | | | | .000 |
| ◇ | 1.000 | | | | | |

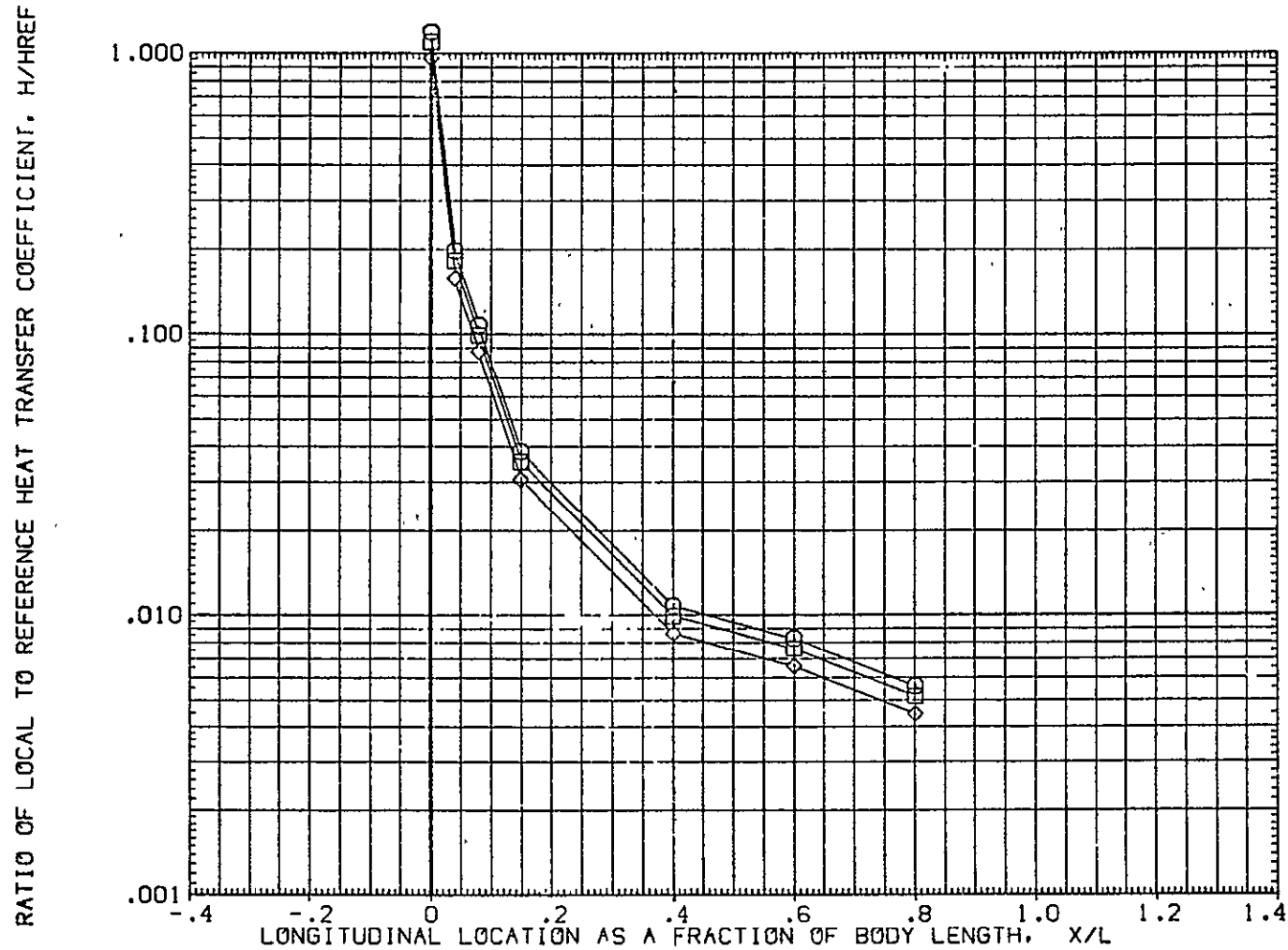
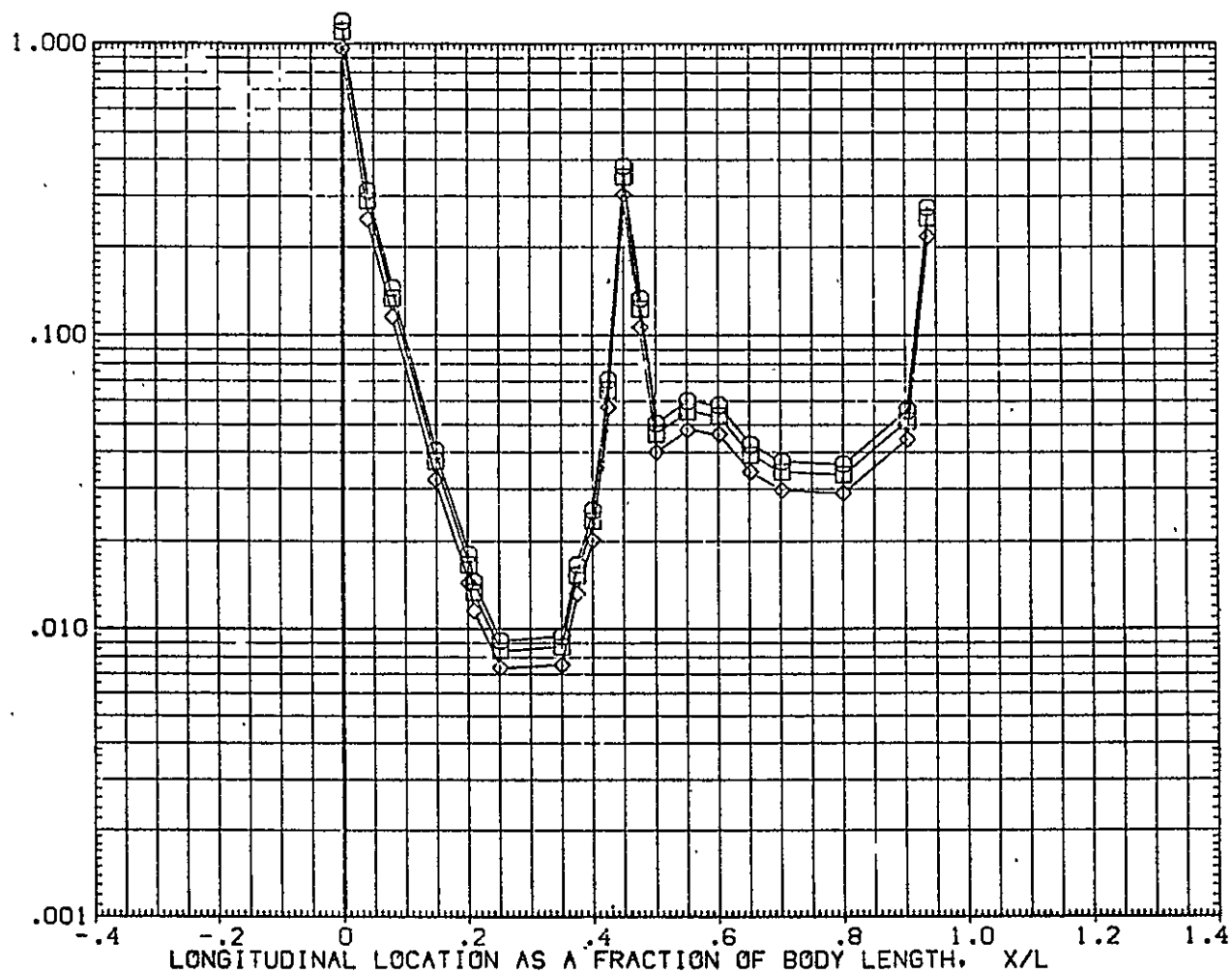


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
|--------|--------|---------|-------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| ○ | .850 | 180.000 | 7.617 | .000 | | .000 |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF} FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

OH12/1H21 (CAL HST 173-100) 37 G T TANK (RUGT05)

| | | | | | | |
|--------|--------|---------|-------|-------|-------------------|------|
| SYMBOL | HAW/HT | PHI | MACH | ALPHA | PARAMETRIC VALUES | |
| ○ | .850 | 199.000 | 7.617 | | .000 | BETA |
| □ | .900 | | | | | .000 |
| ◇ | 1.000 | | | | | |

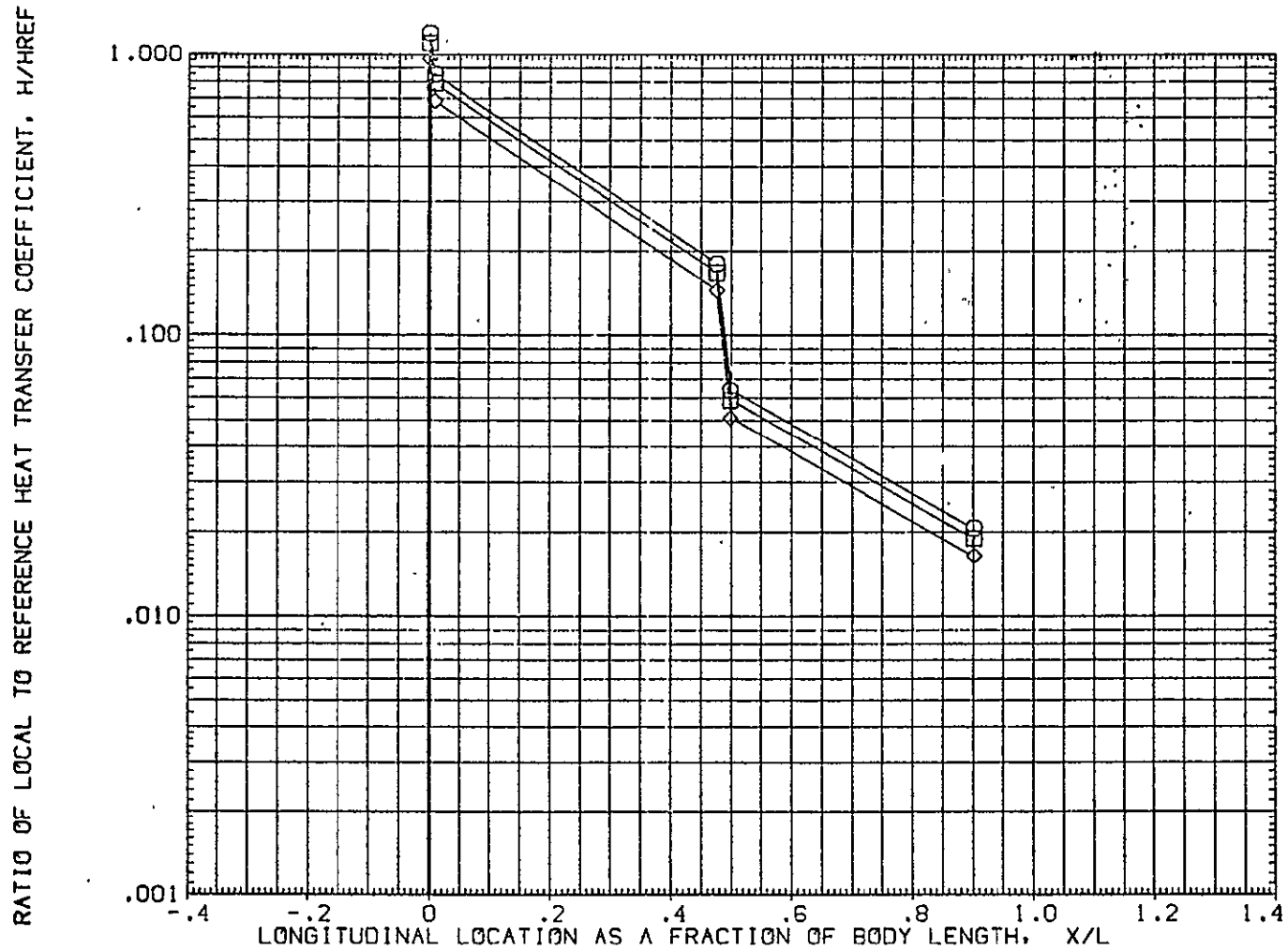


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

OH12/1H21 (CAL HST 173-100) 37 0 T TANK (RUGT05)

| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
|--------|--------|---------|-------|-------------------|------|------|
| ○ | .850 | 221.000 | 7.617 | ALPHA | .00° | BETA |
| □ | .900 | | | | | .000 |
| ◇ | 1.000 | | | | | |

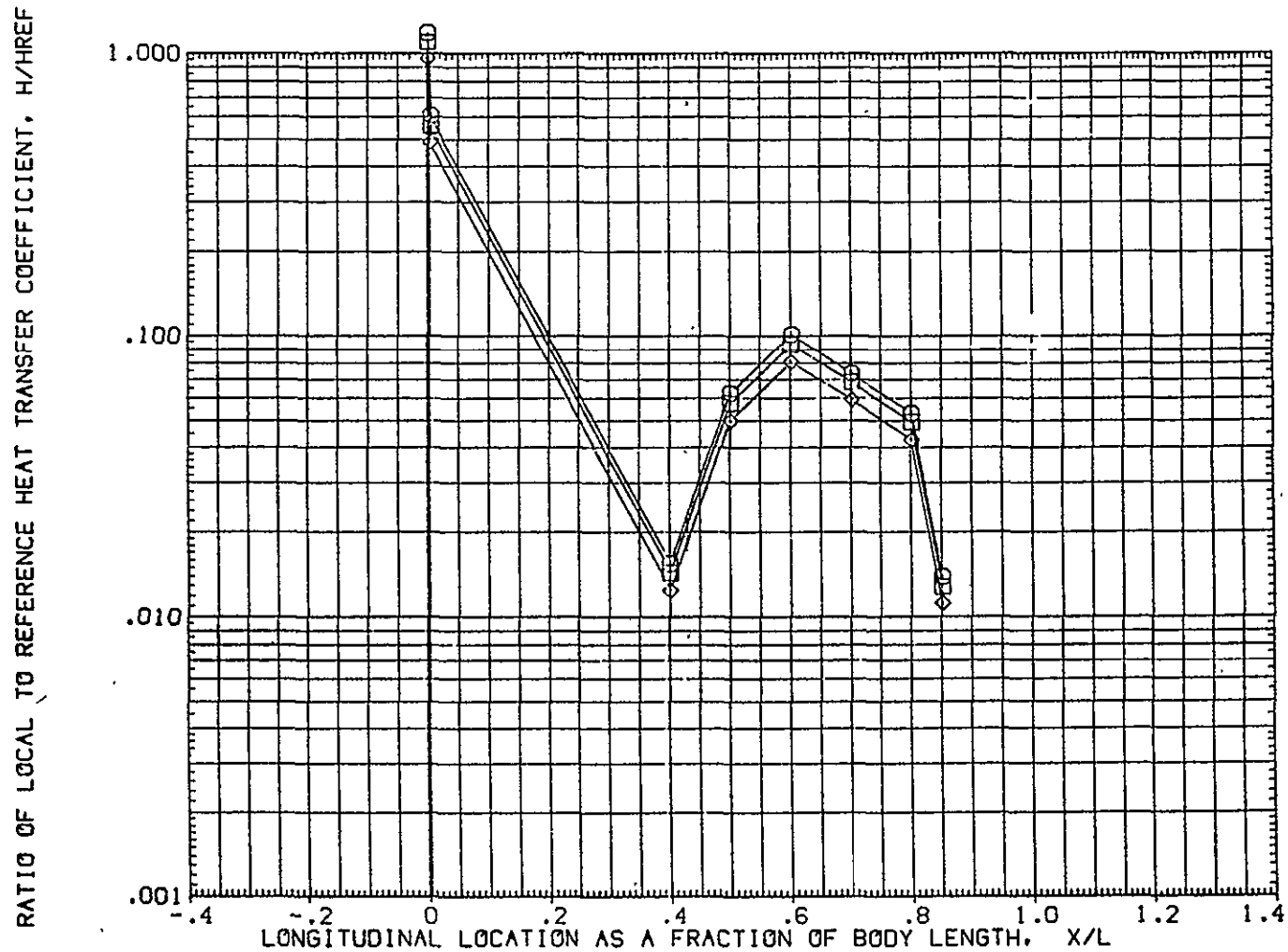


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

OH12/IH21 (CAL HST 173-100) 37 0 T TANK (RUGT05)

| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
|--------|--------|---------|-------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| □ | .850 | 241.000 | 7.617 | .000 | .000 | .000 |
| ◇ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

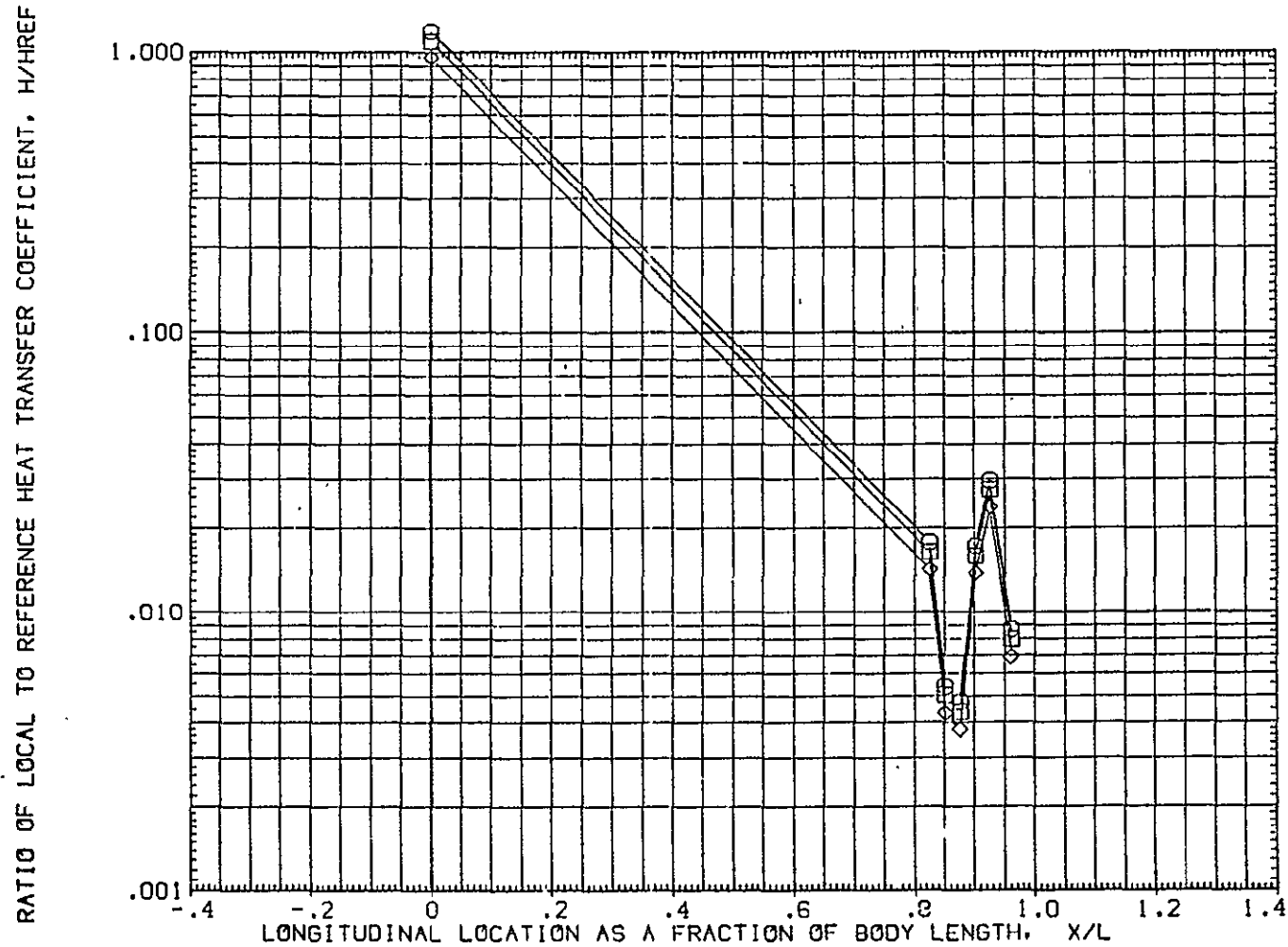


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

OH12/1421 (CAL HST 173-100) 37 0 T TANK (RUGT05)

| SYMBOL | MAW/HT | FHI | PACH | ALPHA | PARAMETRIC VALUES | |
|--------|--------|---------|-------|-------|-------------------|------|
| ◇ | .850 | 247.000 | 7.617 | .000 | BETA | .000 |
| □ | .900 | | | | | |
| ○ | 1.000 | | | | | |

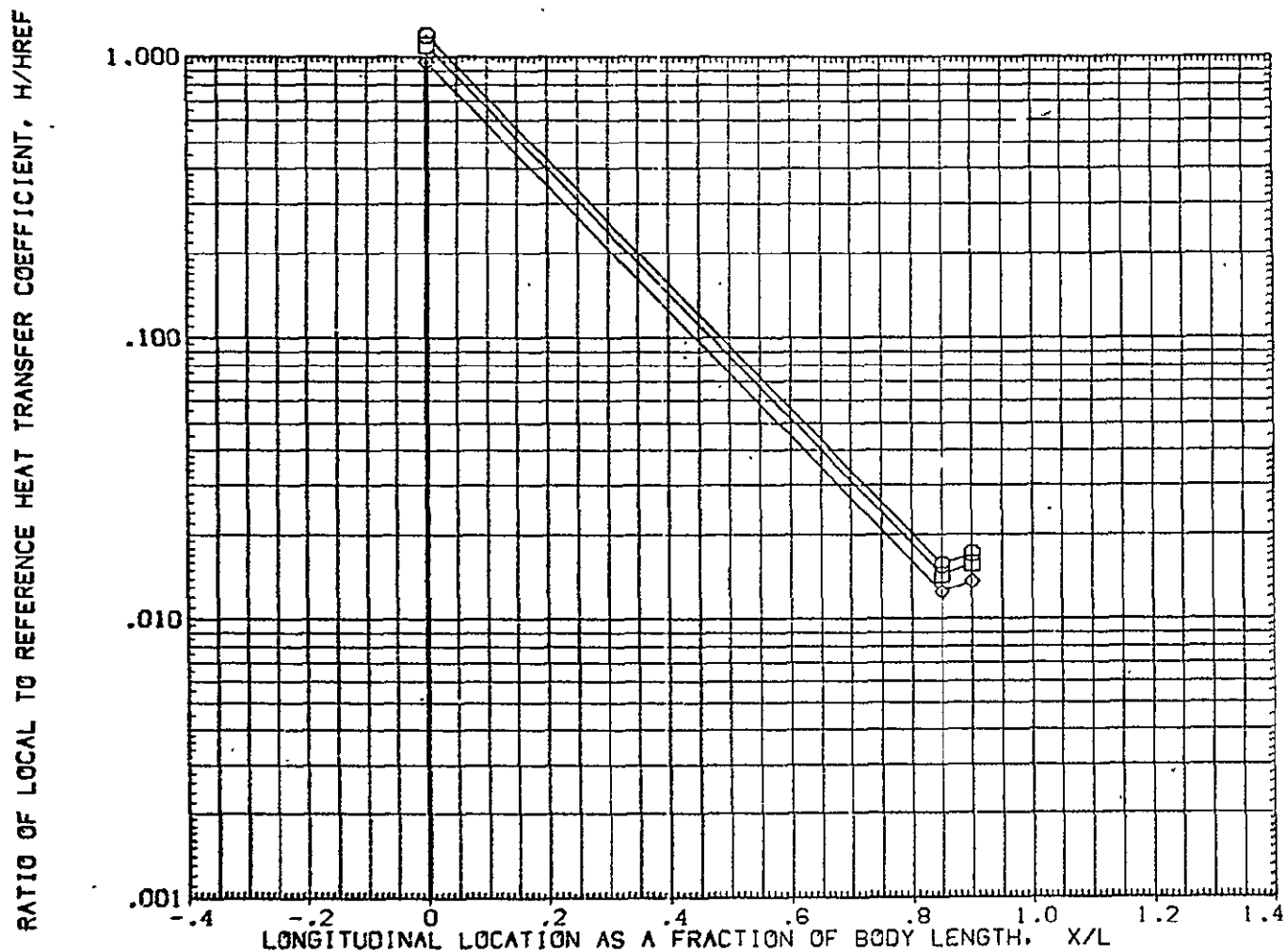


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR

OH12/11121 (CAL HST 173-100) 37 0 T TANK (RUGT05)

| | | | | | | |
|--------|--------|---------|-------|-------------------|------|------|
| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
| ○ | .850 | 270.000 | 7.617 | ALPHA | .000 | BETA |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, h/h_{REF}

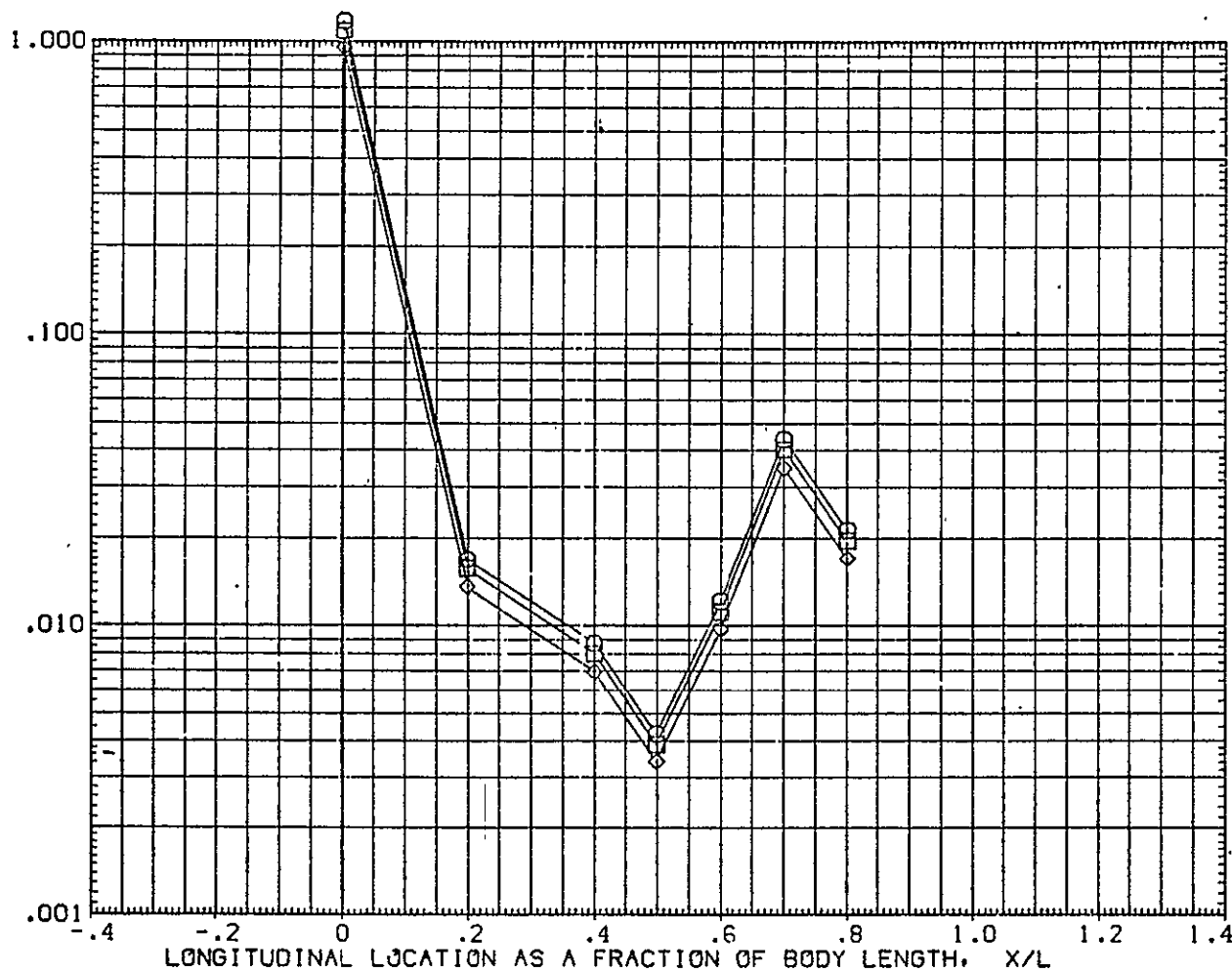


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

OH12/1H21 (CAL HST 173-100) 37 0 T TANK (RUGT05)

| | | | | | | |
|--------|--------|---------|-------|-------------------|------|------|
| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
| ○ | .850 | 315.000 | 7.617 | ALPHA | .000 | BETA |
| □ | .900 | | | | | .000 |
| ◇ | .1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/HREF

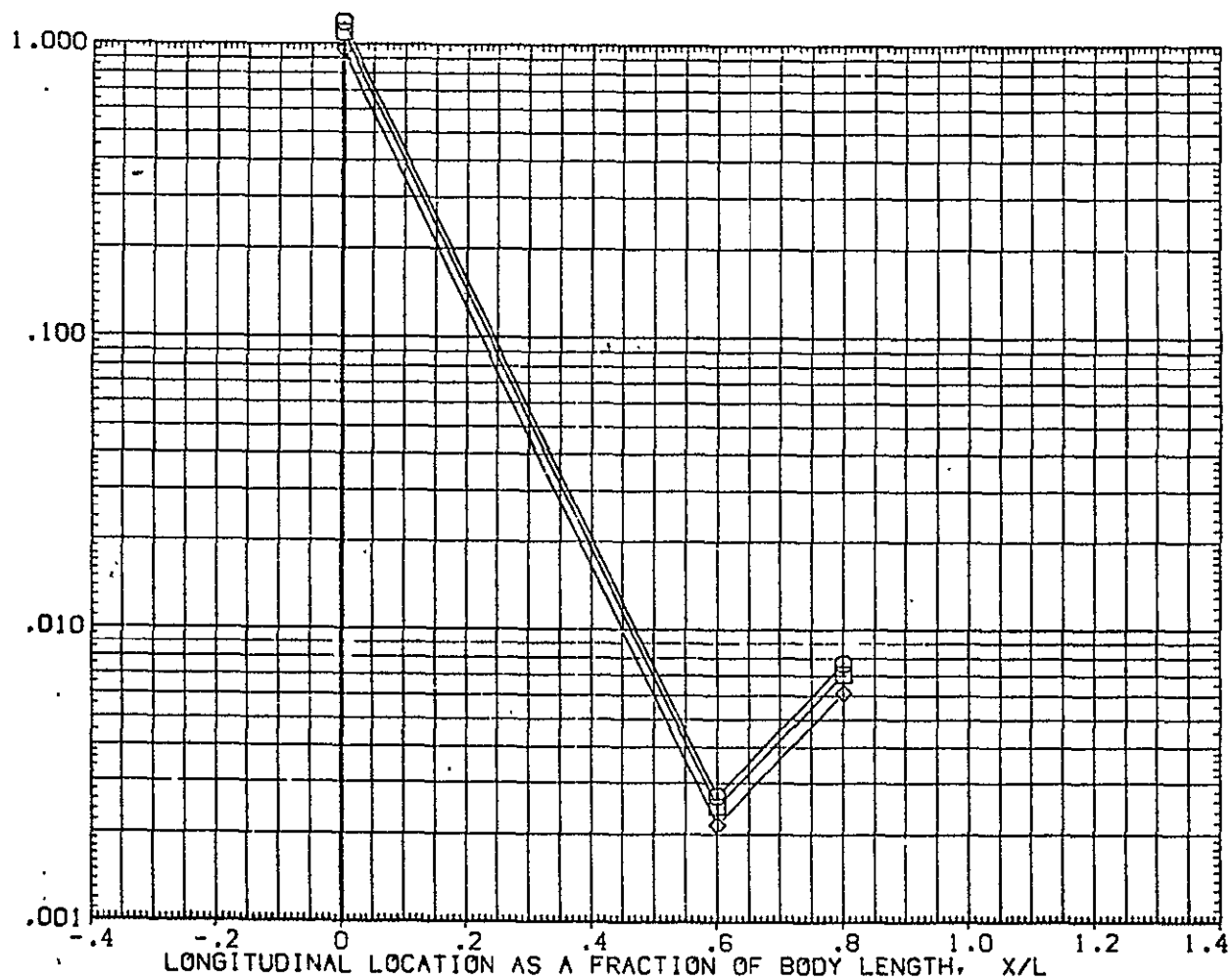


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

OH12/IH21 (CAL HST 173-100) 37 0 T TANK (RUGT05)

| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
|--------|--------|------|--------|-------------------|------|--|
| | | | | ALPHA | BETA | |
| □ | .850 | .000 | 18.170 | | | |
| ◇ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

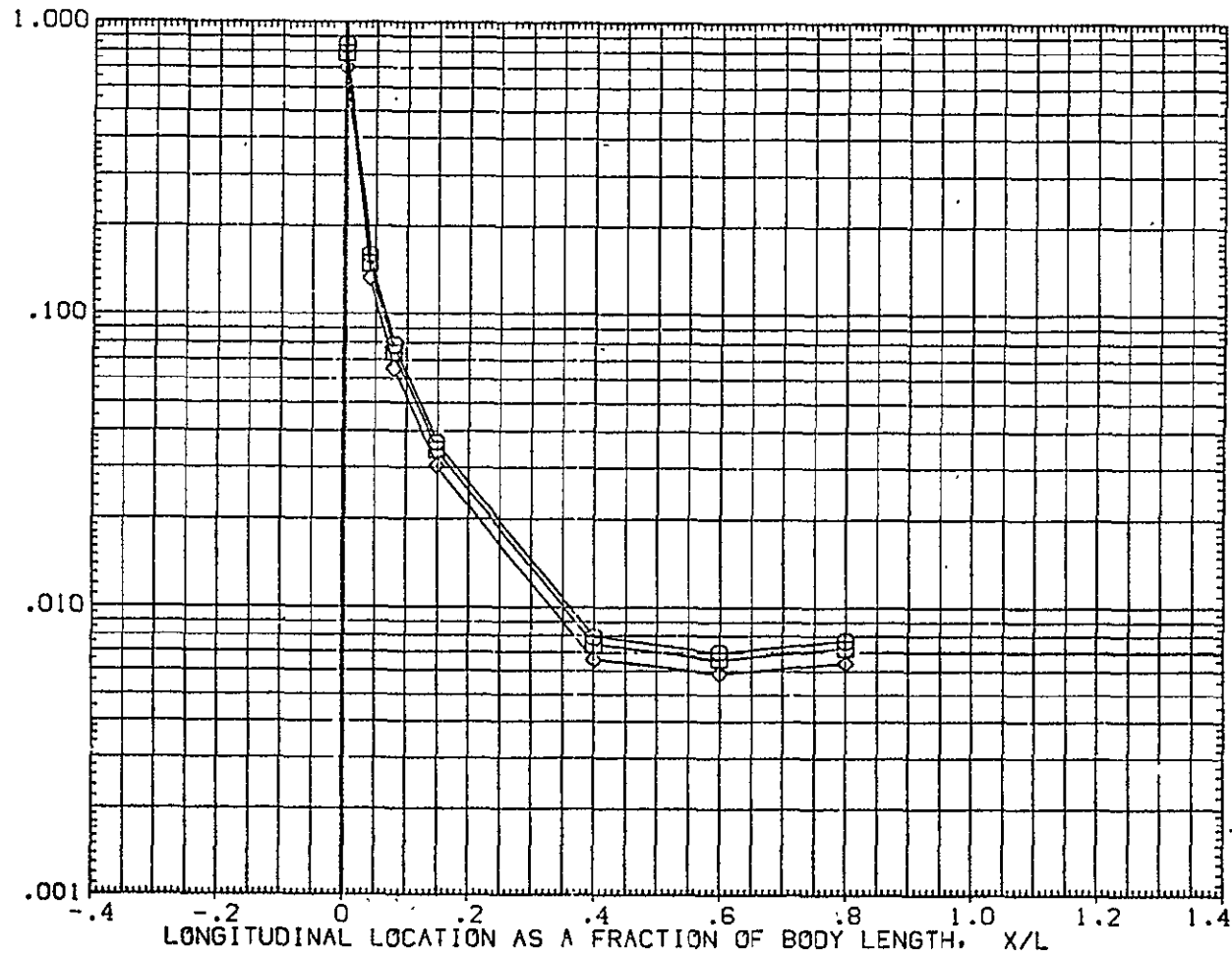


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ $\alpha = 0$

OH12/1H21 (CAL HST 173-100) 37 0 T TANK (RUGT05)

| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
|--------|--------|---------|--------|-------------------|------|------|
| ○ | .850 | 180.000 | 18.170 | ALPHA | .000 | BETA |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, h/h_{REF}

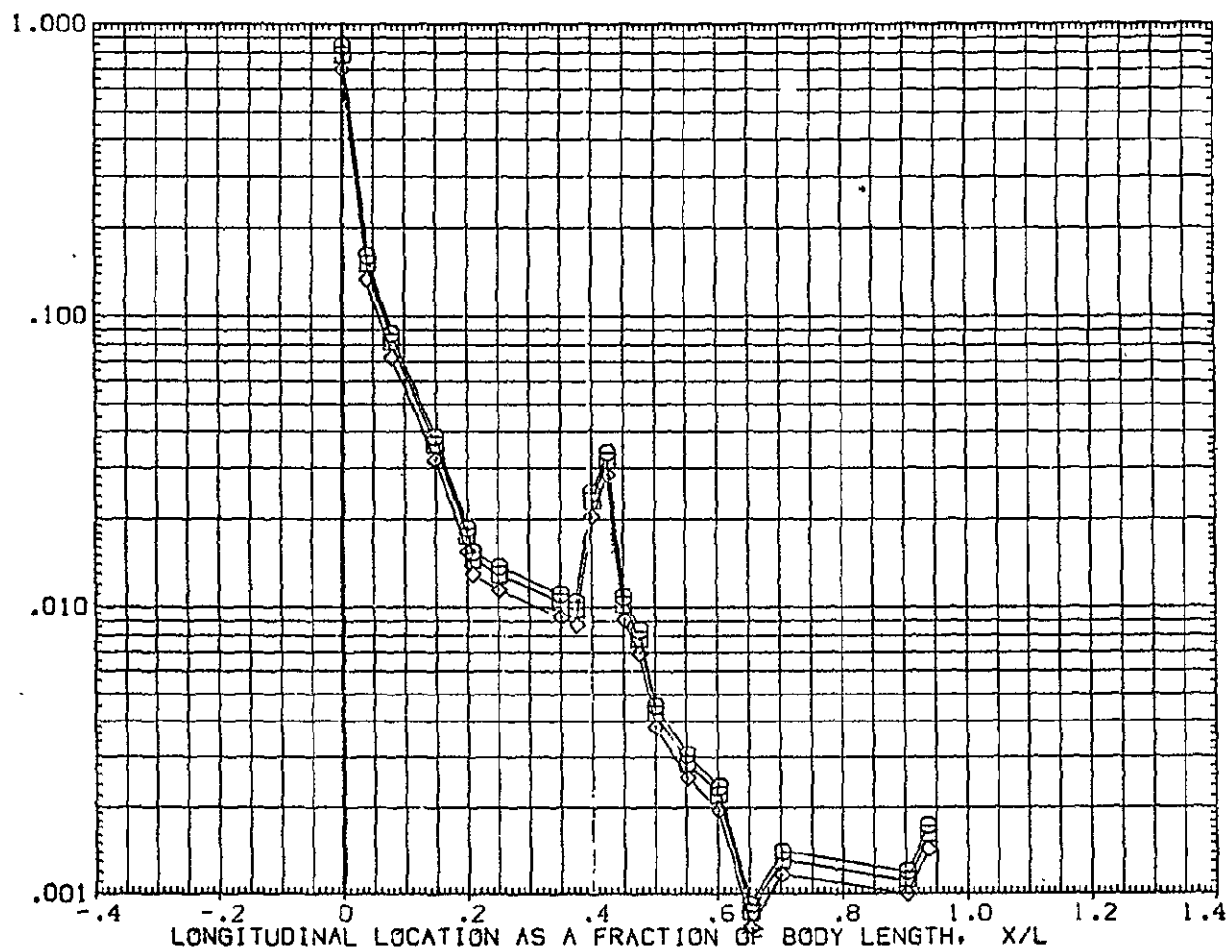


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

OH12/IH21 (CAL HST 173-100) 37 0 T TANK (RUGT05)

| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
|--------|--------|---------|--------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| ◇ | .850 | 199.000 | 18.170 | .000 | .000 | .000 |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

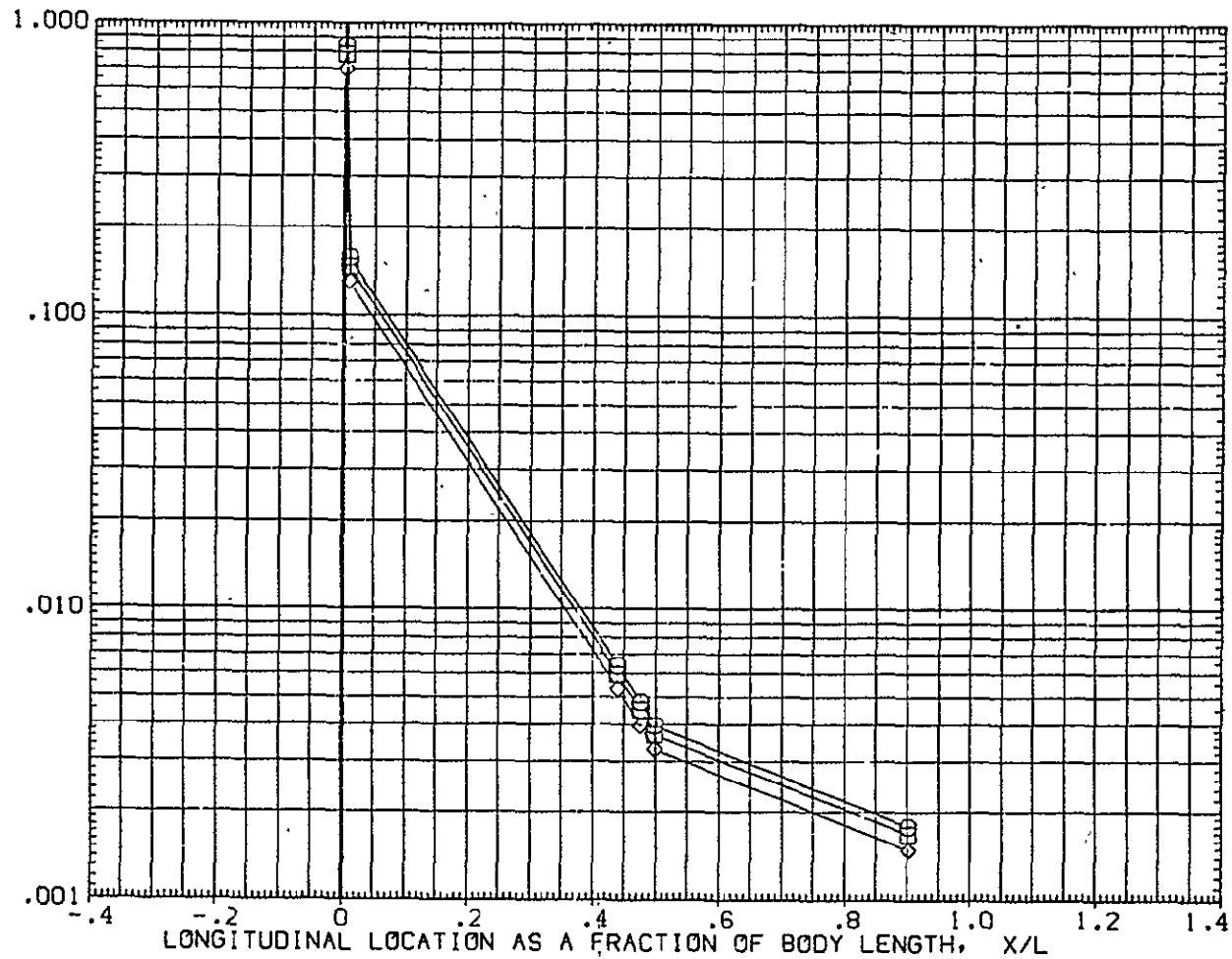


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ $\alpha = 0$

0H12/IH21 (CAL HST 173-100) 37 0 7 TANK (RUGT05)

| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
|--------|--------|---------|--------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| ◇ | .850 | 221.000 | 18.170 | .000 | .000 | .000 |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

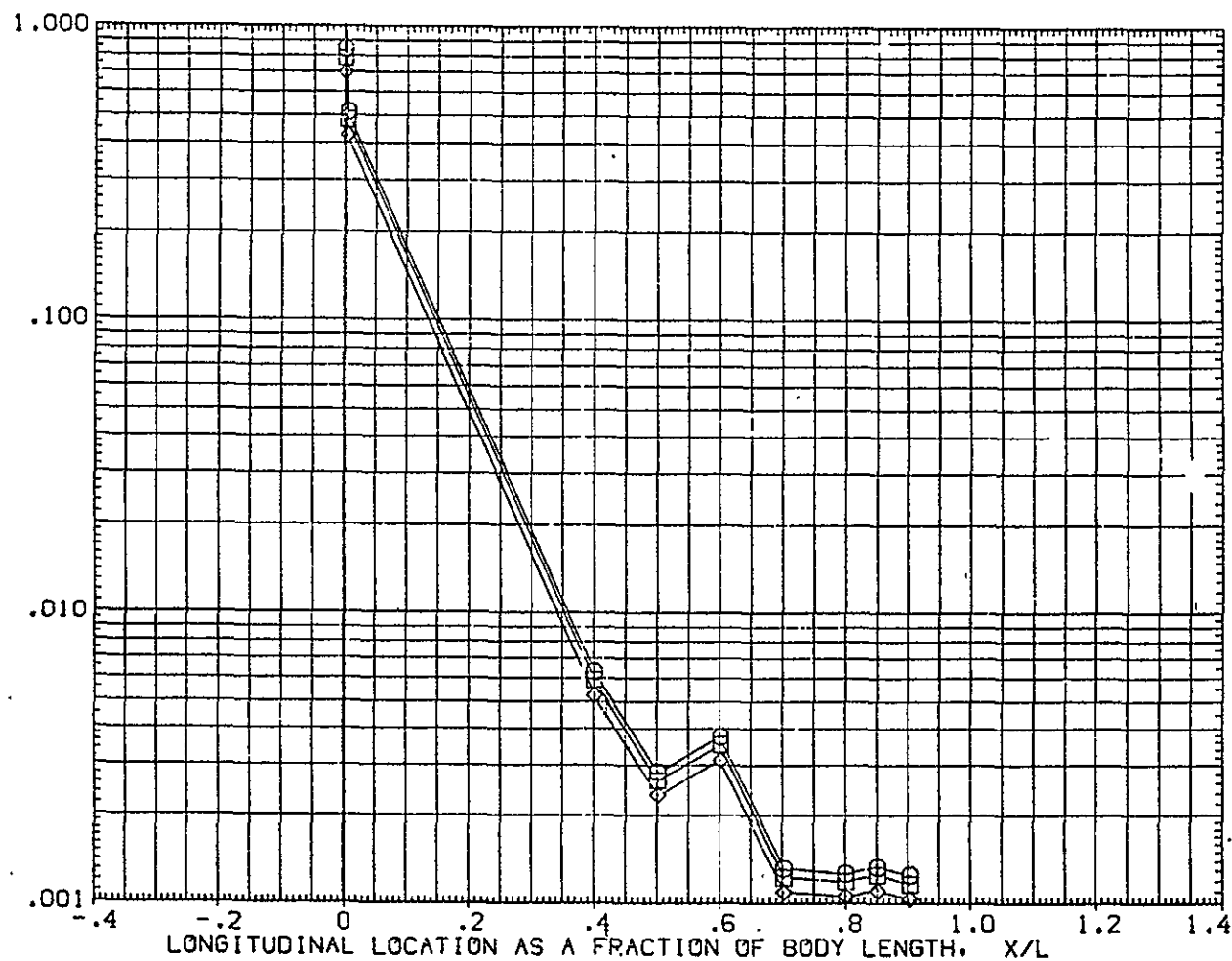


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

0H12/1H21 (CAL HST 173-100) 37 0 T TANK (RUGT05)

| SYMBOL | HAW/HT | PHI | MACH | ALPHA | PARAMETRIC VALUES | BETA | .000 |
|--------|--------|---------|--------|-------|-------------------|------|------|
| ◇ | .850 | 241.000 | 18.170 | | | | |
| ◇ | .900 | | | | | | |
| ◇ | 1.000 | | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

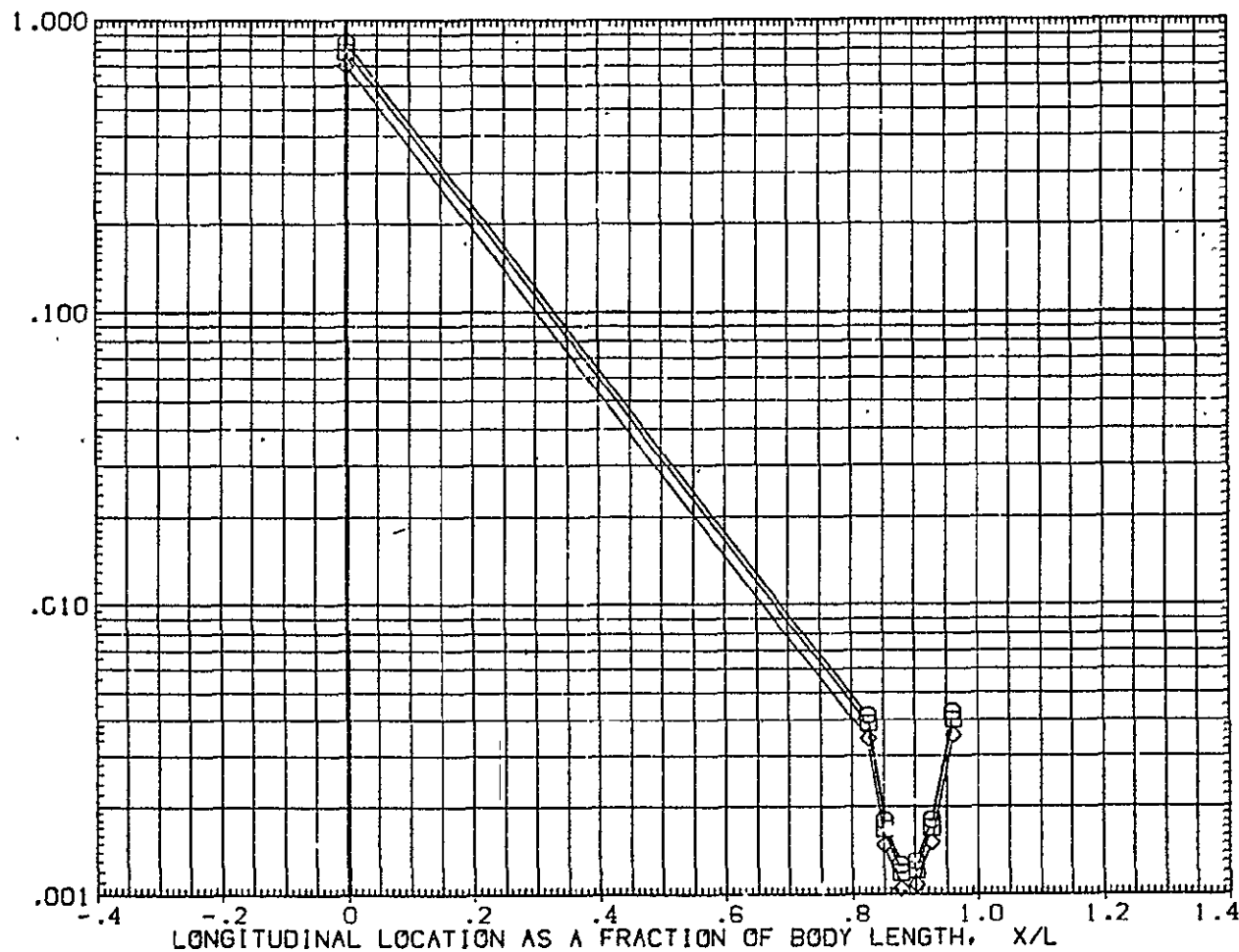


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

0412/1H21 (CAL HST 173-100) 37 0 T TANK (RUGT05)

| | | | | | | |
|--------|--------|---------|--------|-------------------|------|------|
| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
| ○ | .850 | 247.000 | 18.170 | ALPHA | .000 | BETA |
| □ | .900 | | | | | .000 |
| ◇ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, h/h_{REF}

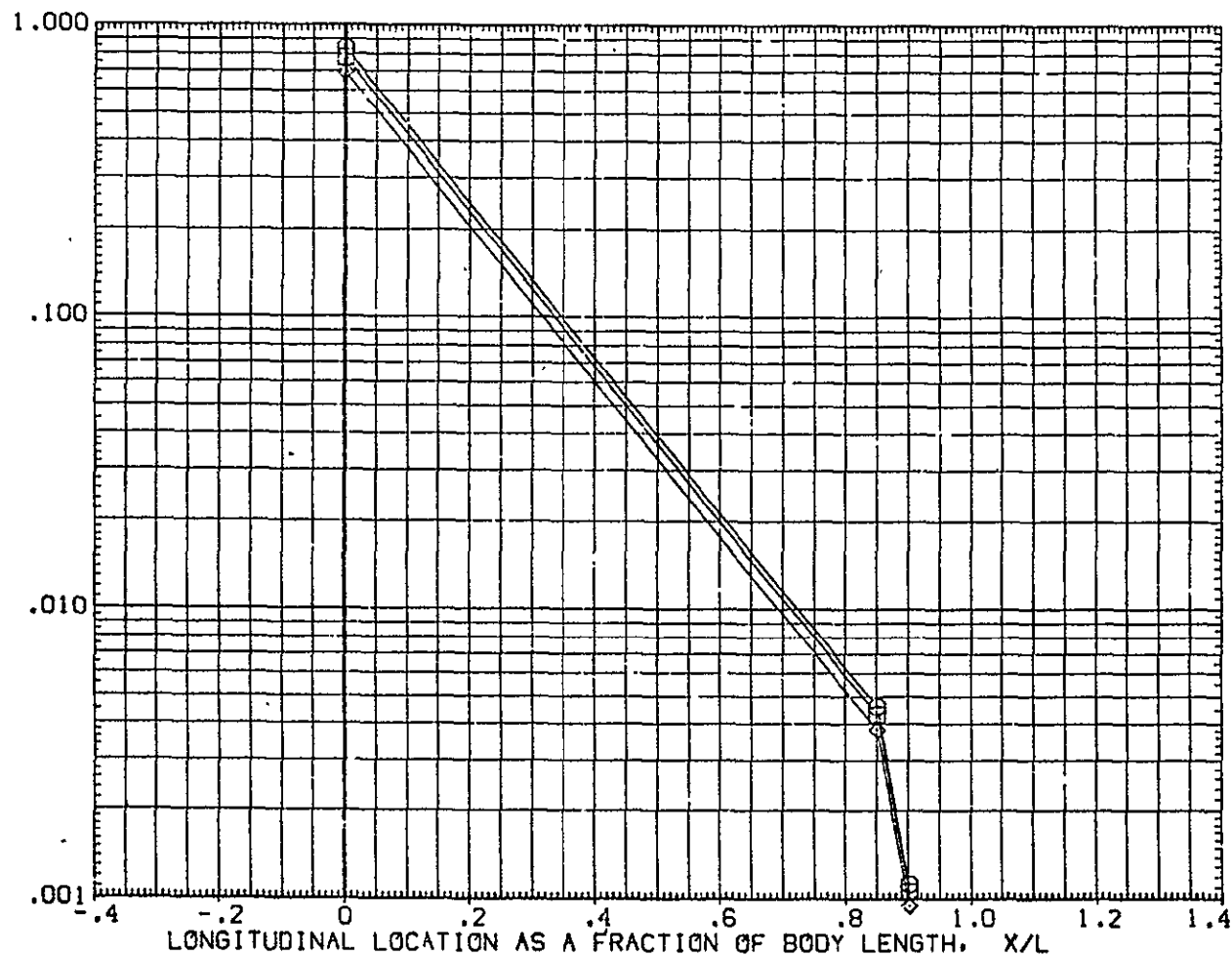


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ $\alpha = 0$

OH12/1H21 (CAL HST 173-100) 37 0 T TANK (RUGT05)

| SYMBOL | HAW/HT | PHI | MACH | ALPHA | PARAMETRIC VALUES | |
|--------|--------|---------|--------|-------|-------------------|------|
| □ | .850 | 270.000 | 18.170 | .000 | BETA | .000 |
| ◇ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

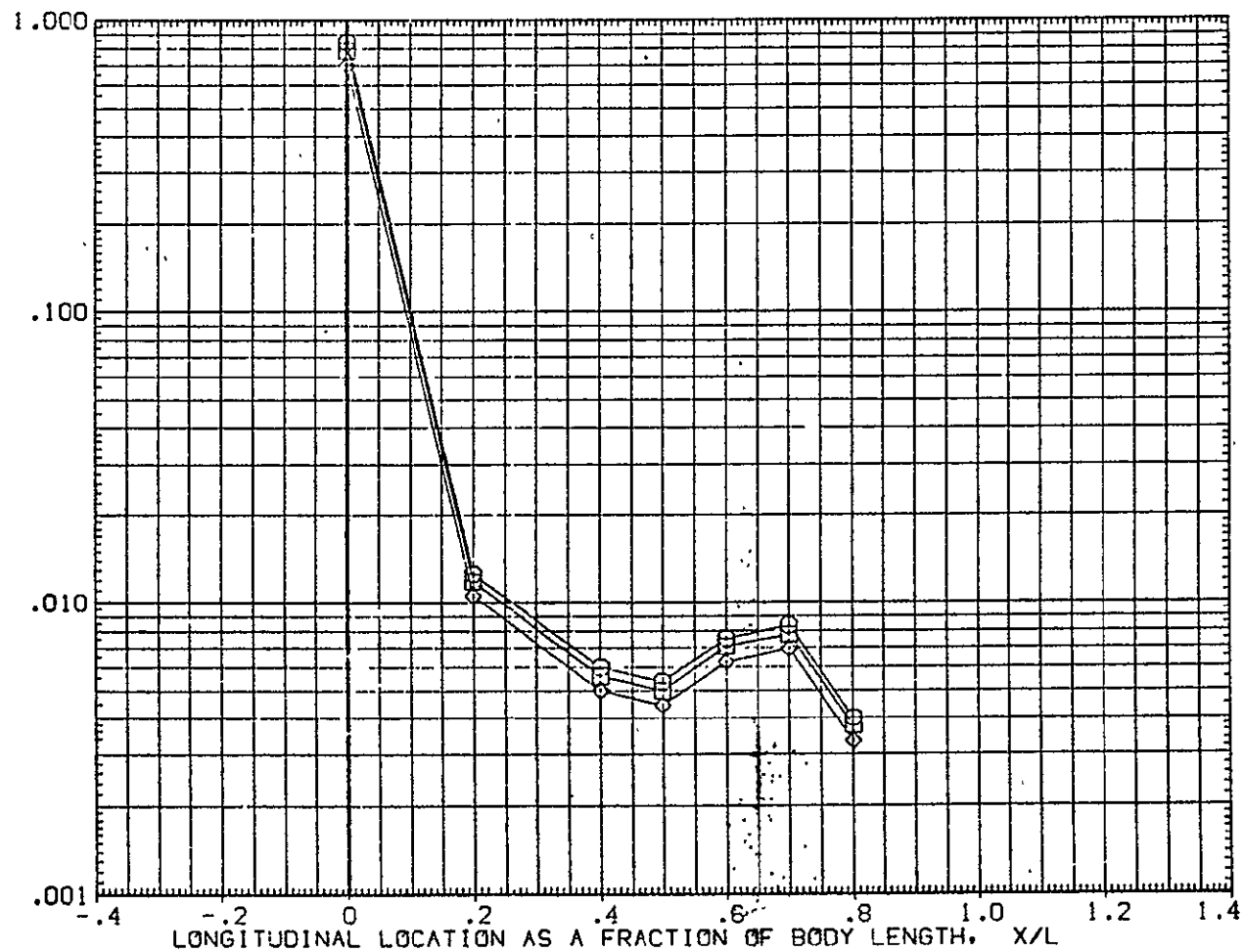


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

0H12/1H21 (CAL HST 173-100) 37 0 T TANK (RUGT05)

| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
|--------|--------|---------|--------|-------------------|------|------|
| ◇ | .850 | 315.000 | 18.170 | ALPHA | .000 | BETA |
| □ | .900 | | | | | .000 |
| ○ | 1.000 | | | | | |

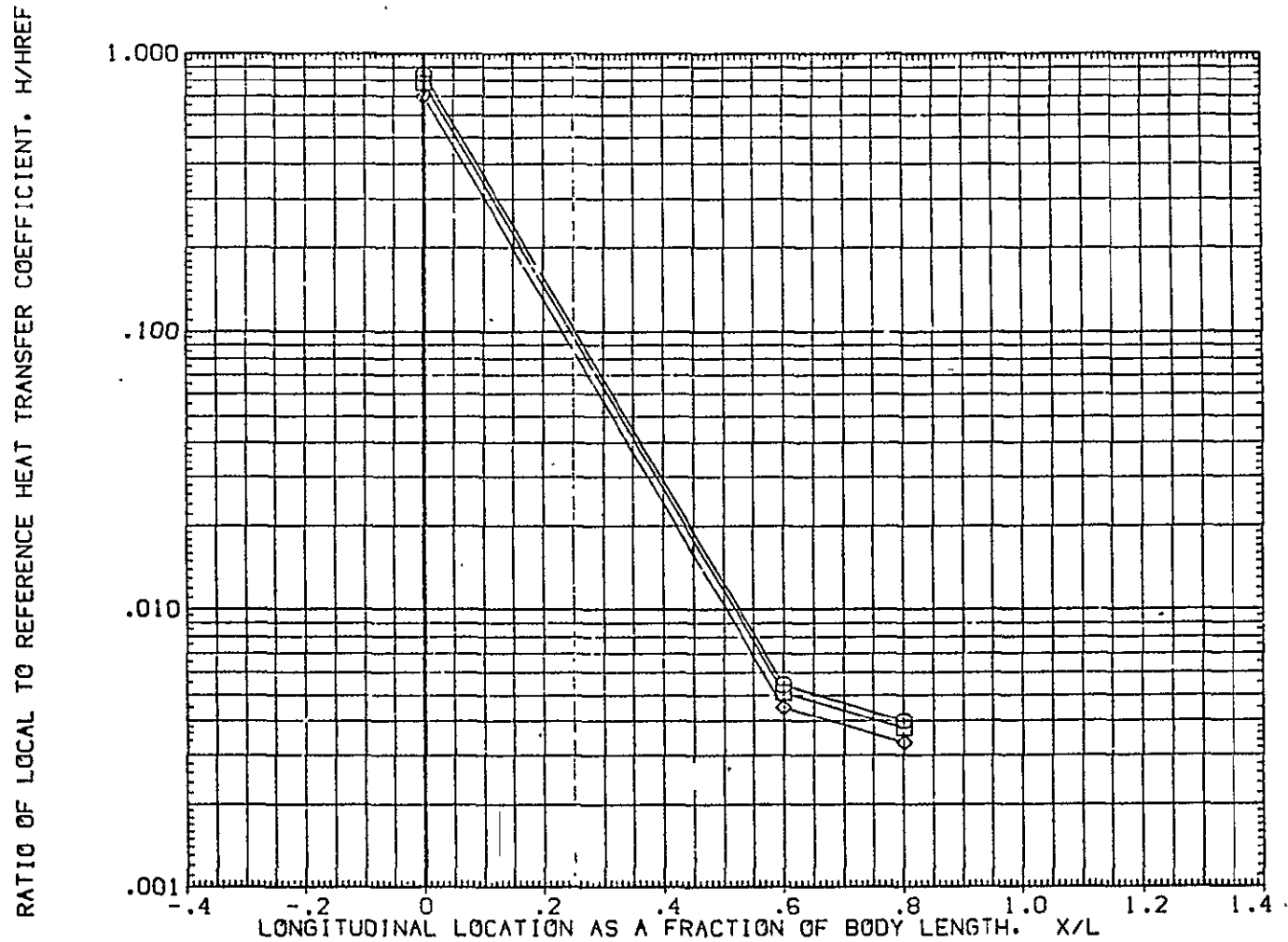


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

OH12/IH21 (CAL HST 173-100) 37 0 T TANK (RUGT05)

| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
|--------|--------|------|--------|-------------------|------|--|
| | | | | ALPHA | BETA | |
| ○ | .950 | .000 | 18.950 | | | |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

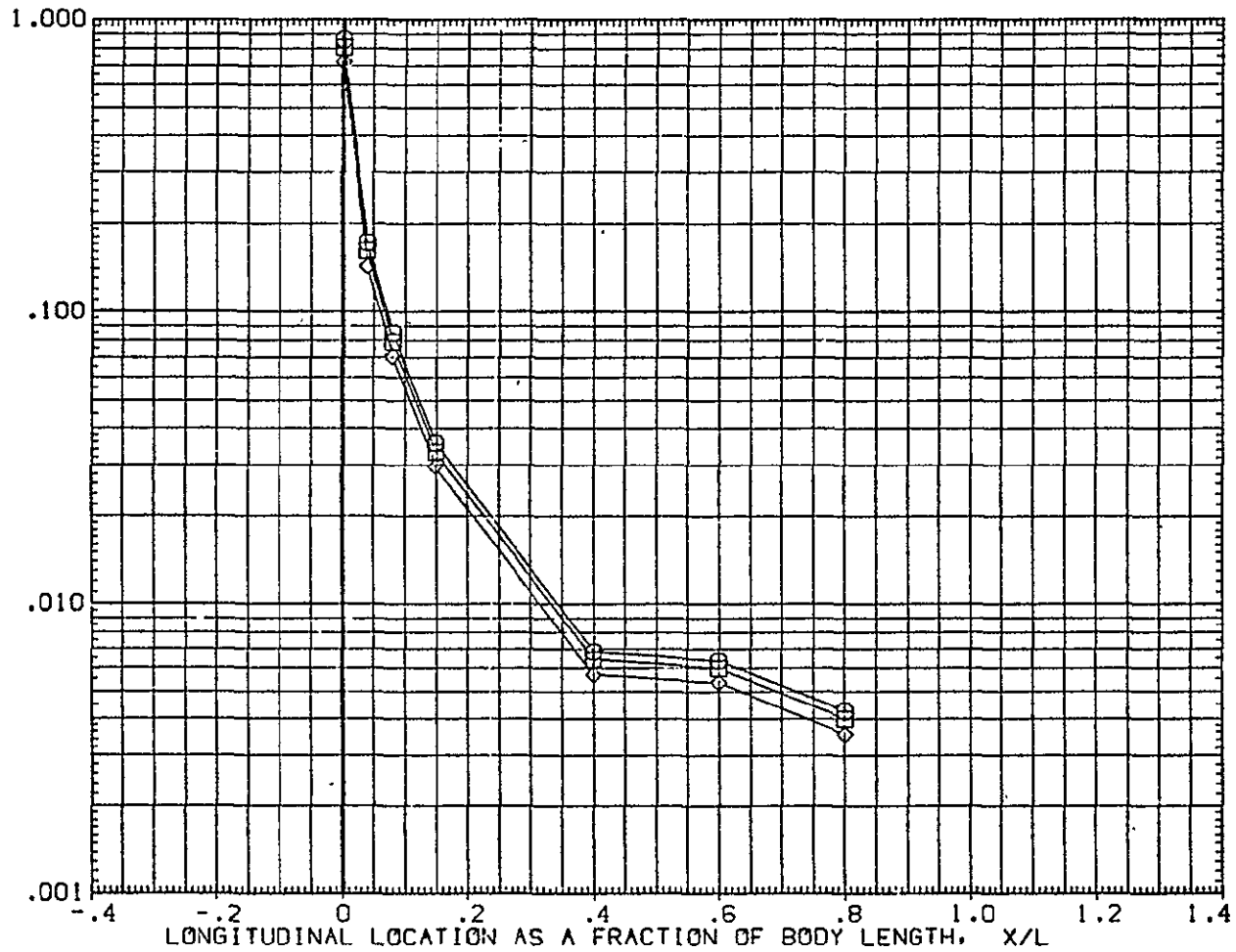


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER RN/L ALPHA = 0

GH12/IH21 (CAL HST I73-100) 37 0 T TANK (RUGT05)

| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
|--------|--------|---------|--------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| ○ | .850 | 180.000 | 18.950 | .000 | .000 | .000 |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

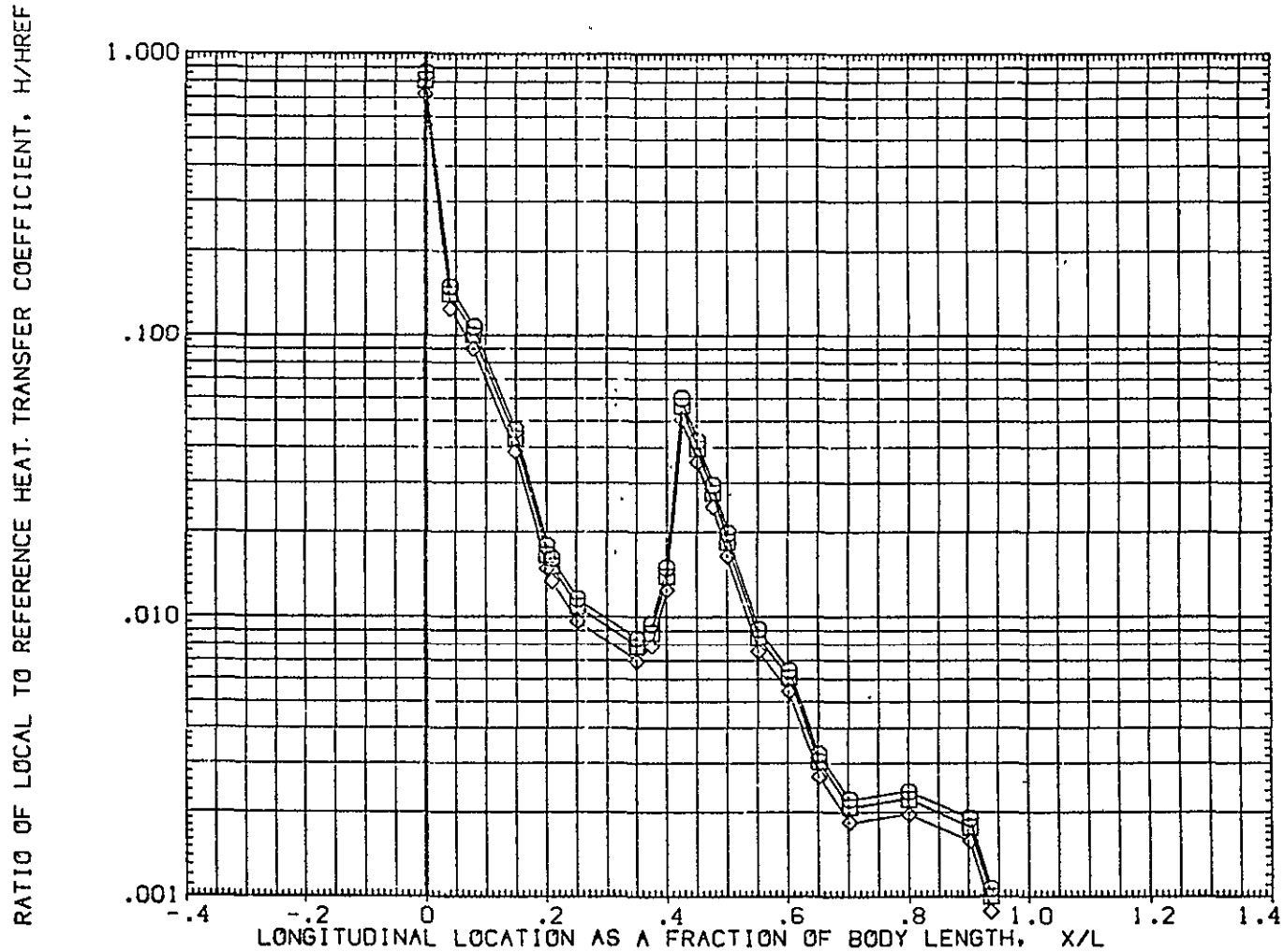


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

OH12/IH21 (CAL HST I73-100) 37 0 T TANK (RUGT05)

| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
|--------|--------|---------|--------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| ◇ | .850 | 199.000 | 18.950 | .000 | .000 | .000 |
| □ | .900 | | | | | |
| ○ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, h/h_{REF}

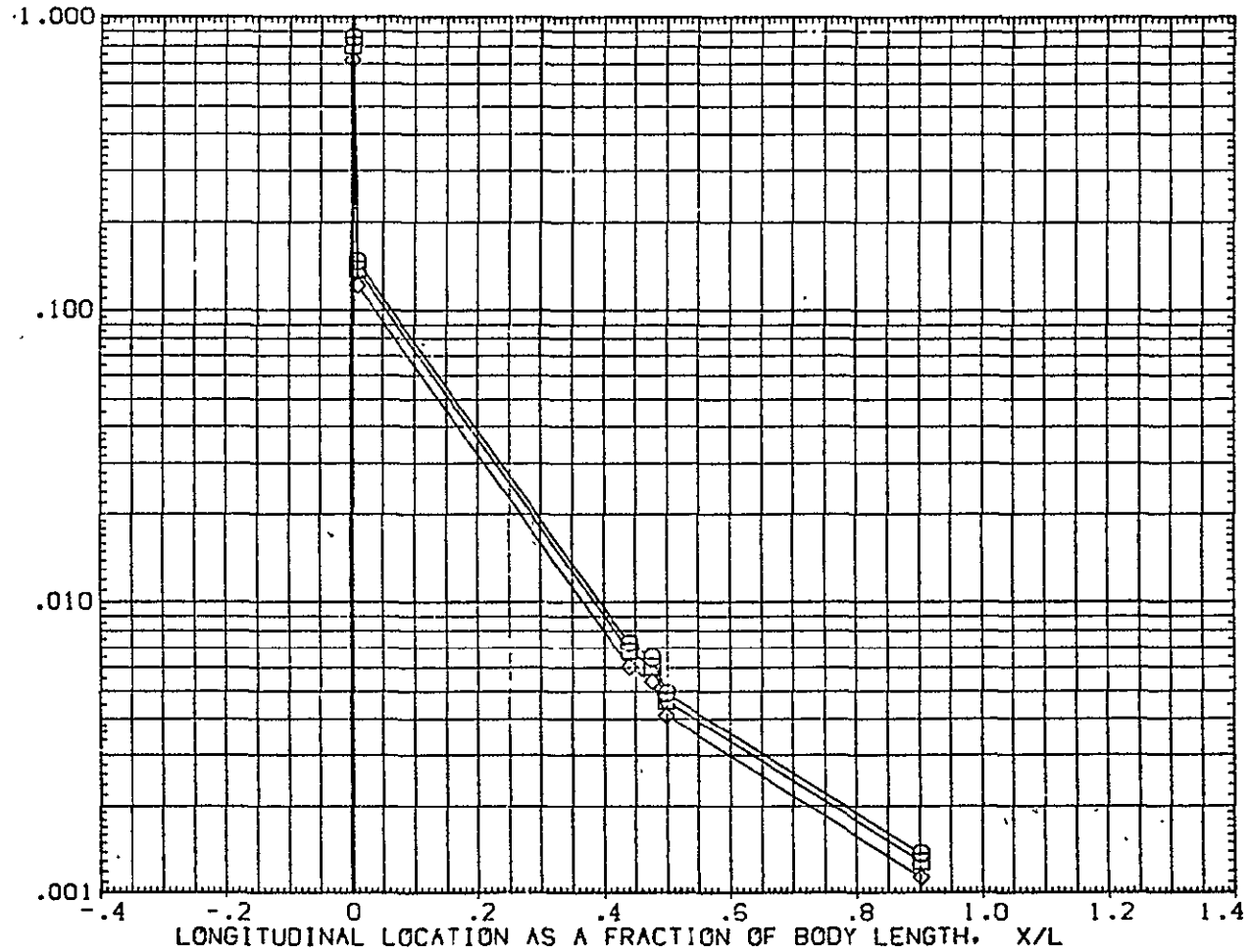


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

OH12/IH21 (CAL HST 173-100) 37 0 T TANK (RUGT05)

| | | | | | | |
|--------|--------|---------|--------|-------------------|------|------|
| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
| ○ | .850 | 221.000 | 18.950 | ALPHA | .000 | BETA |
| □ | .900 | | | | | .000 |
| ◇ | 1.000 | | | | | |

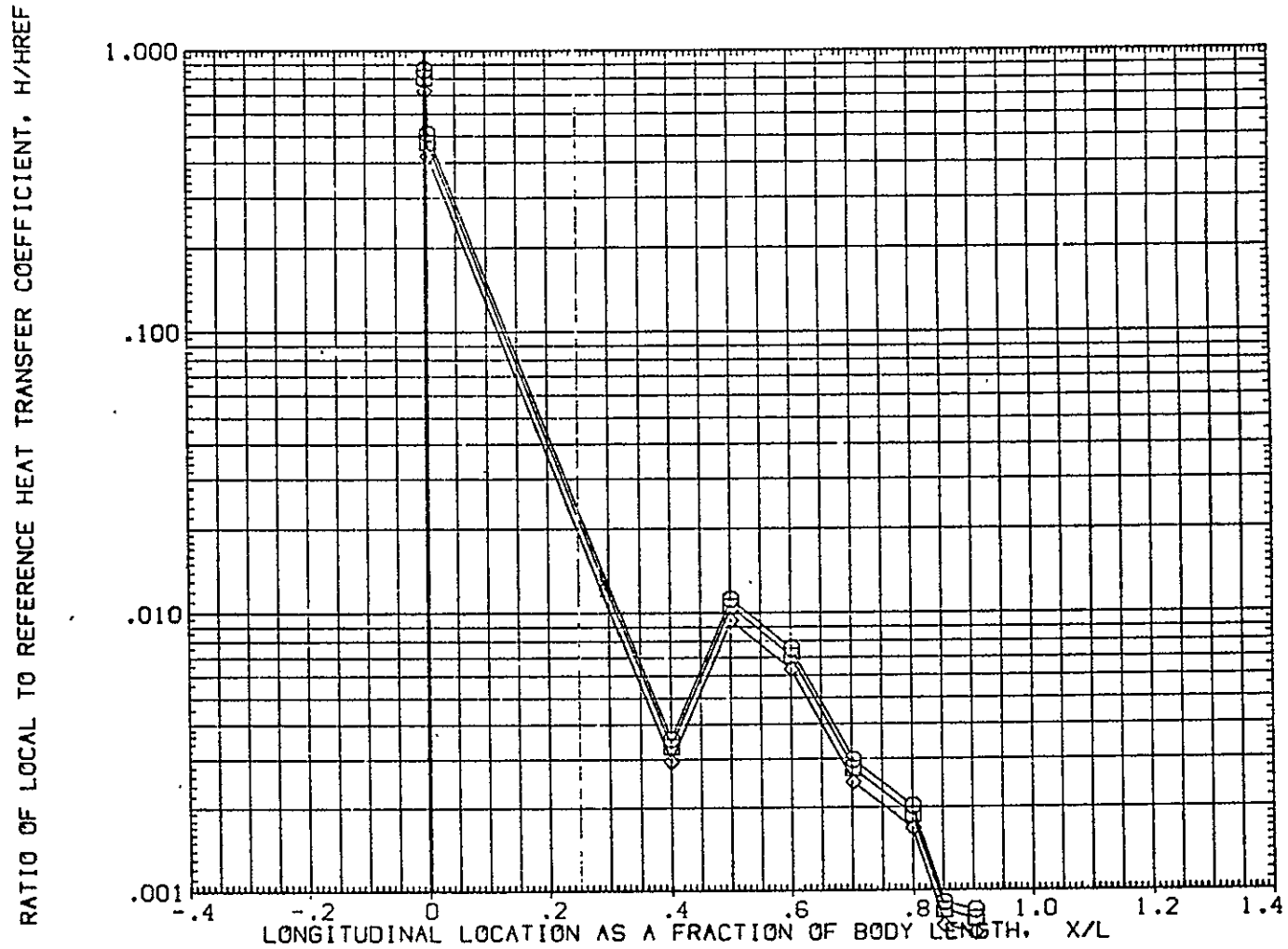


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

0H12/IH21 (CAL HST 173-100) 37 0 T TANK (RUGT05)

| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
|--------|--------|---------|--------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| ○ | .850 | 241.000 | 18.950 | .000 | .000 | .000 |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

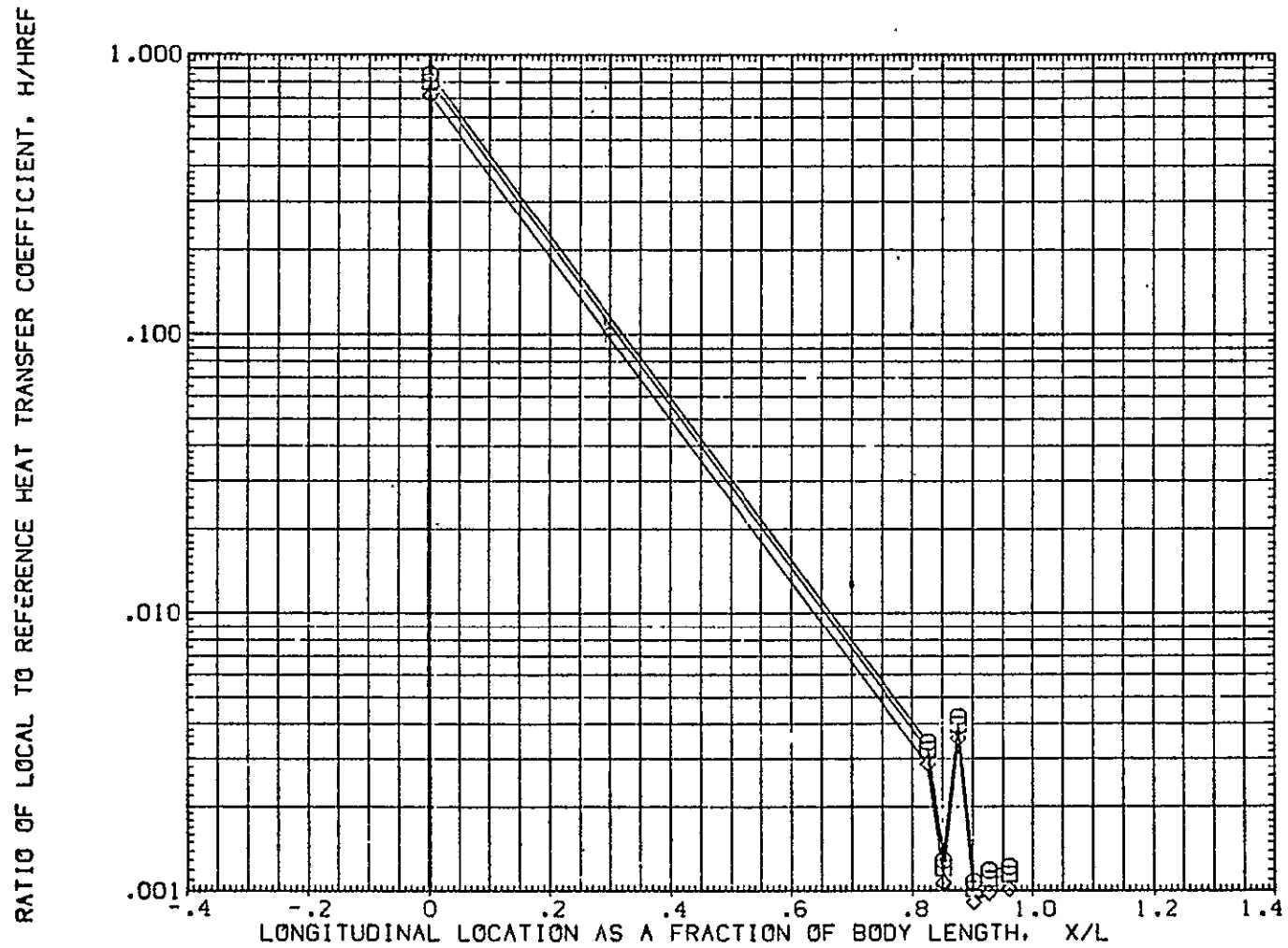


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER RN/L $\alpha = 0$

OH12/IH21 (CAL HST 173-100) 37 0 T TANK (RUGT05)

| SYMBOL | HAW/HT | PHI | MACH | ALPHA | BETA | PARAMETRIC VALUES |
|--------|--------|---------|--------|-------|------|-------------------|
| ◇ | .850 | 247.000 | 18.950 | .000 | .000 | |
| □ | .950 | | | | | |
| ○ | 1.000 | | | | | |

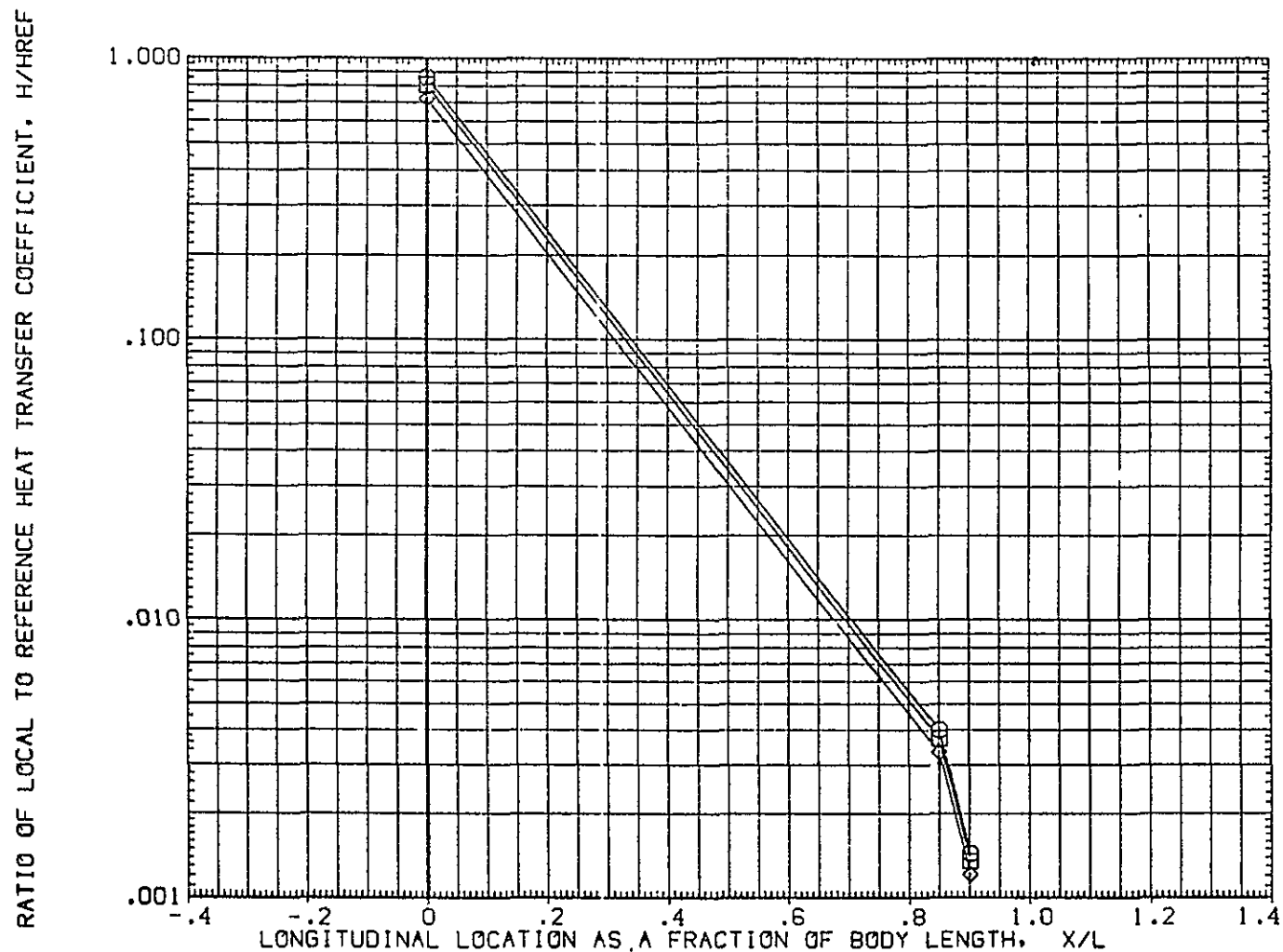


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

0H12/IH21 (CAL HST 173-100) 37 0 T TANK (RUGT05)

| | | | | | | |
|--------|--------|---------|--------|-------------------|------|------|
| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
| ◇ | .850 | 270.000 | 18.950 | ALPHA | .000 | BETA |
| □ | .900 | | | | | .000 |
| ○ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

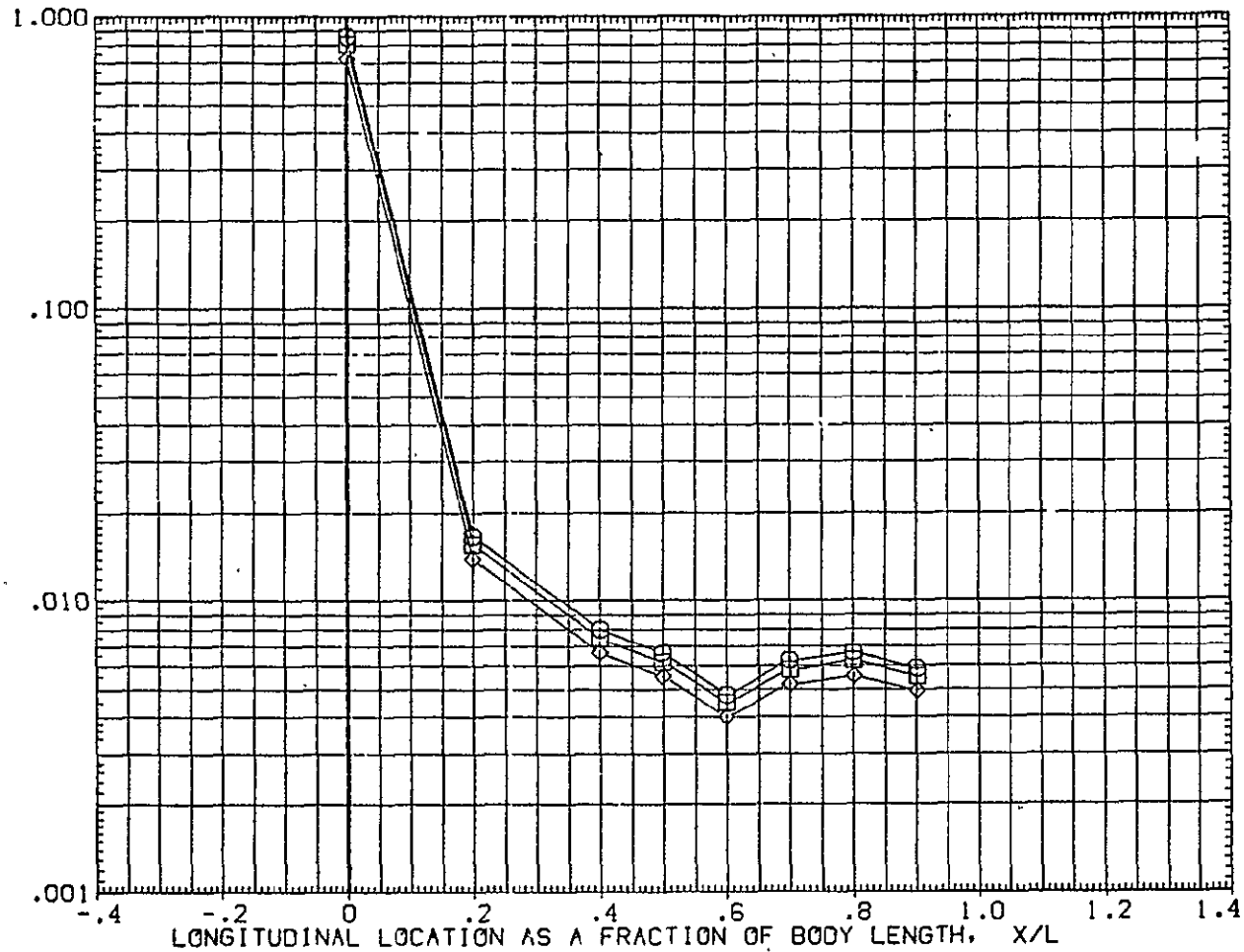


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ $\alpha = 0$

OH12/1421 (CAL HST 173-100) 37 0 T TANK (RUGT05)

| | | | | | | |
|--------|--------|---------|--------|-------------------|------|------|
| SYMBOL | HAW/H* | PHI | MACH | PARAMETRIC VALUES | | |
| ○ | .850 | 315.000 | 18.950 | ALPHA | .000 | BETA |
| □ | .900 | | | | | .000 |
| ◇ | 1.000 | | | | | |

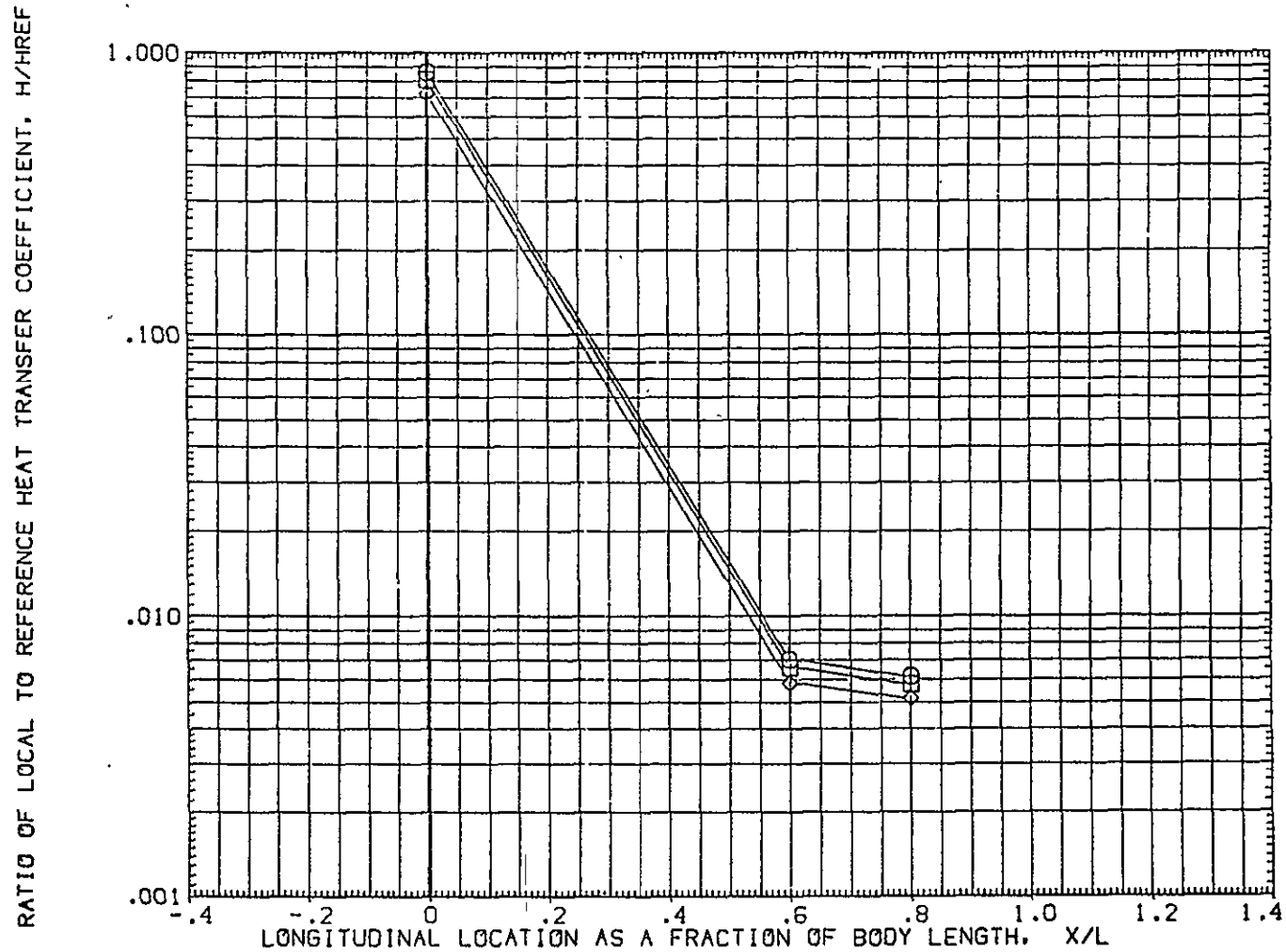


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

OH12 + IH21 MODEL 37 OT(05)/T(01) TANK (IUGT05)

| | | | | | | | |
|--------|--------|------|-------|-------|-------------------|------|------|
| SYMBOL | HAW/HT | PHI | MACH | ALPHA | PARAMETRIC VALUES | BETA | |
| ○ | .900 | .000 | 7.000 | | .000 | | .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, H_i/H_u

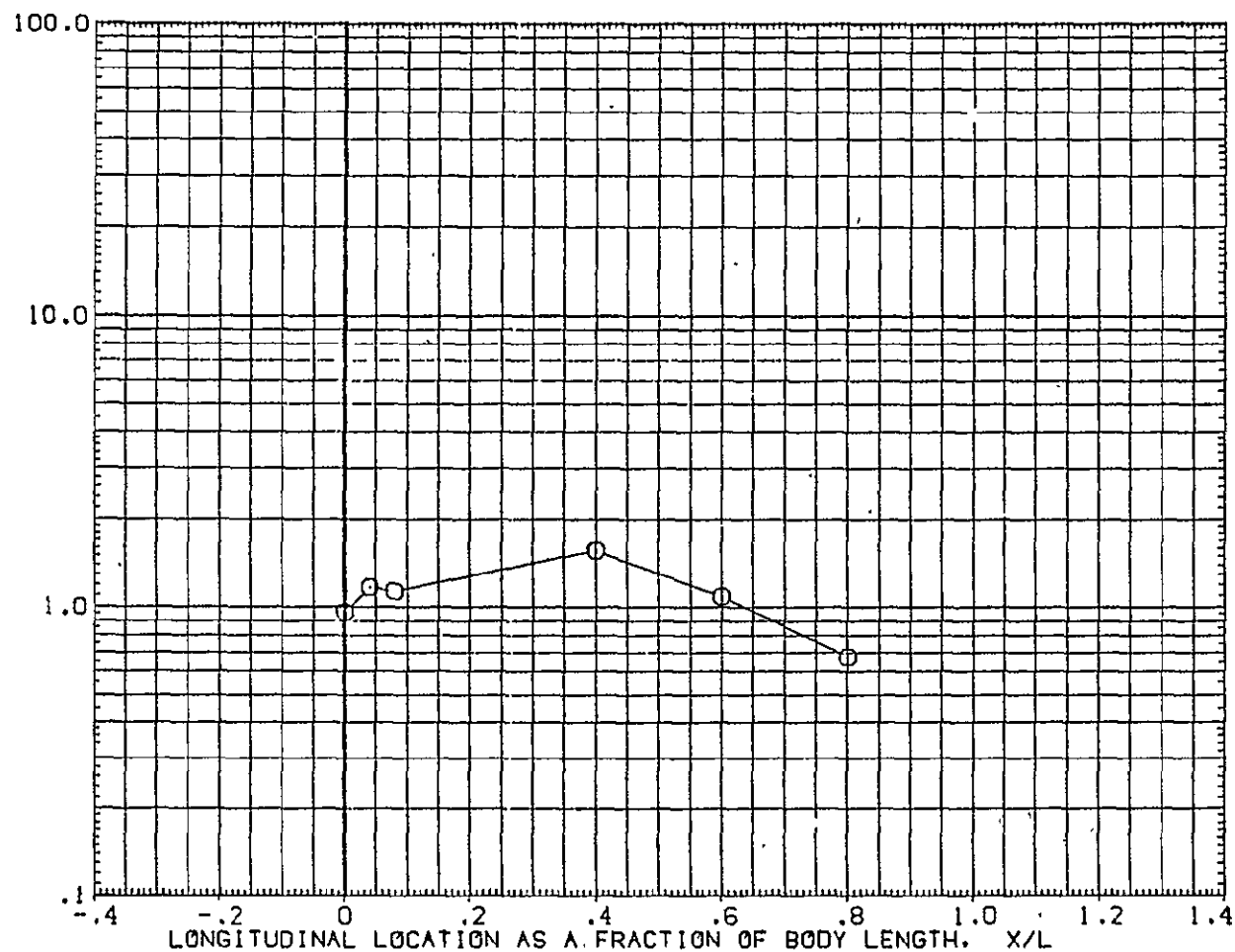


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

OH12 + IH21 MODEL 37 OT(05)/T(01) TANK (1UGT05)

SYMBOL
O
HAW/HT
.900
PHI
180.000
MACH
7.000

PARAMETRIC VALUES
ALPHA
.000
BETA
.000

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU

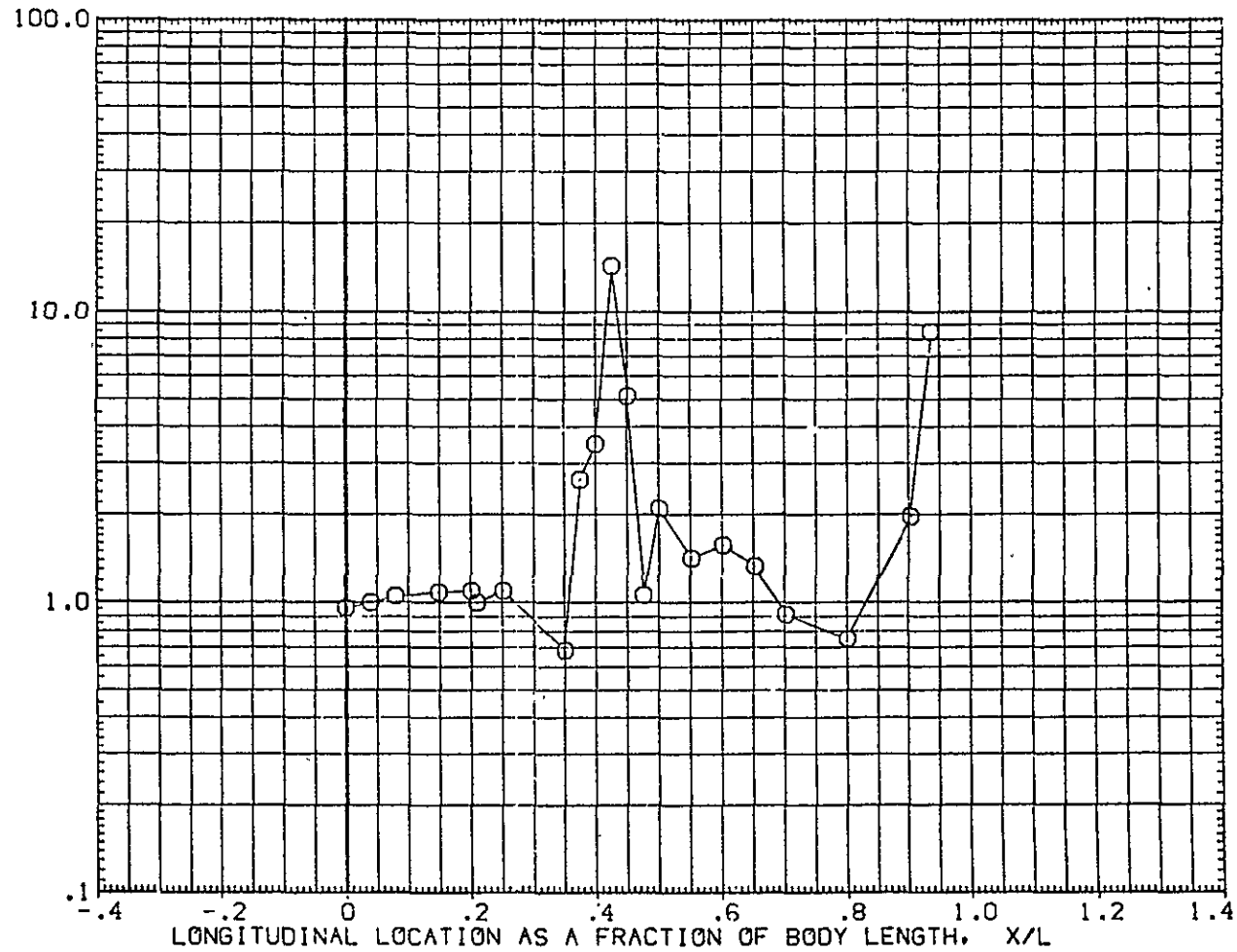


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

OH12 + [H21 MODEL 37 OT(05)/T(01) TANK

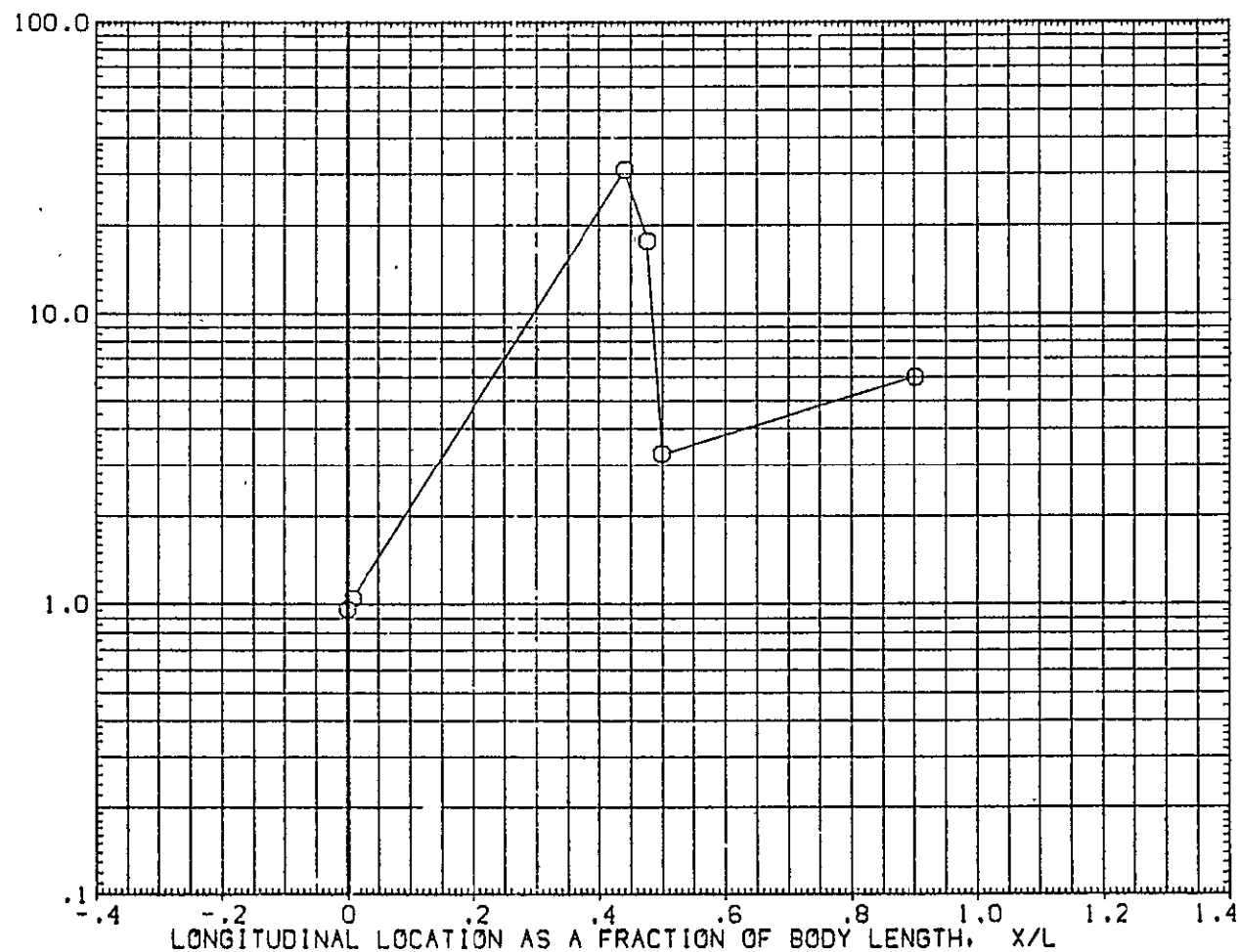
(1UGT05)

SYMBOL
OHAW/HT
.900PHI
199.000MACH
7.000

ALPHA

PARAMETRIC VALUES
.000 BETA

.000

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, h_i/h_u FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER RN/LI ALPHA = 0

OH12 + IH21 MODEL 37 OT(05)/T(01) TANK (1UG105)

SYMBOL
O
HAW/HT
.900
PHI
221.000
MACH
7.000

PARAMETRIC VALUES
.000 BETA .000

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, h_i/h_u

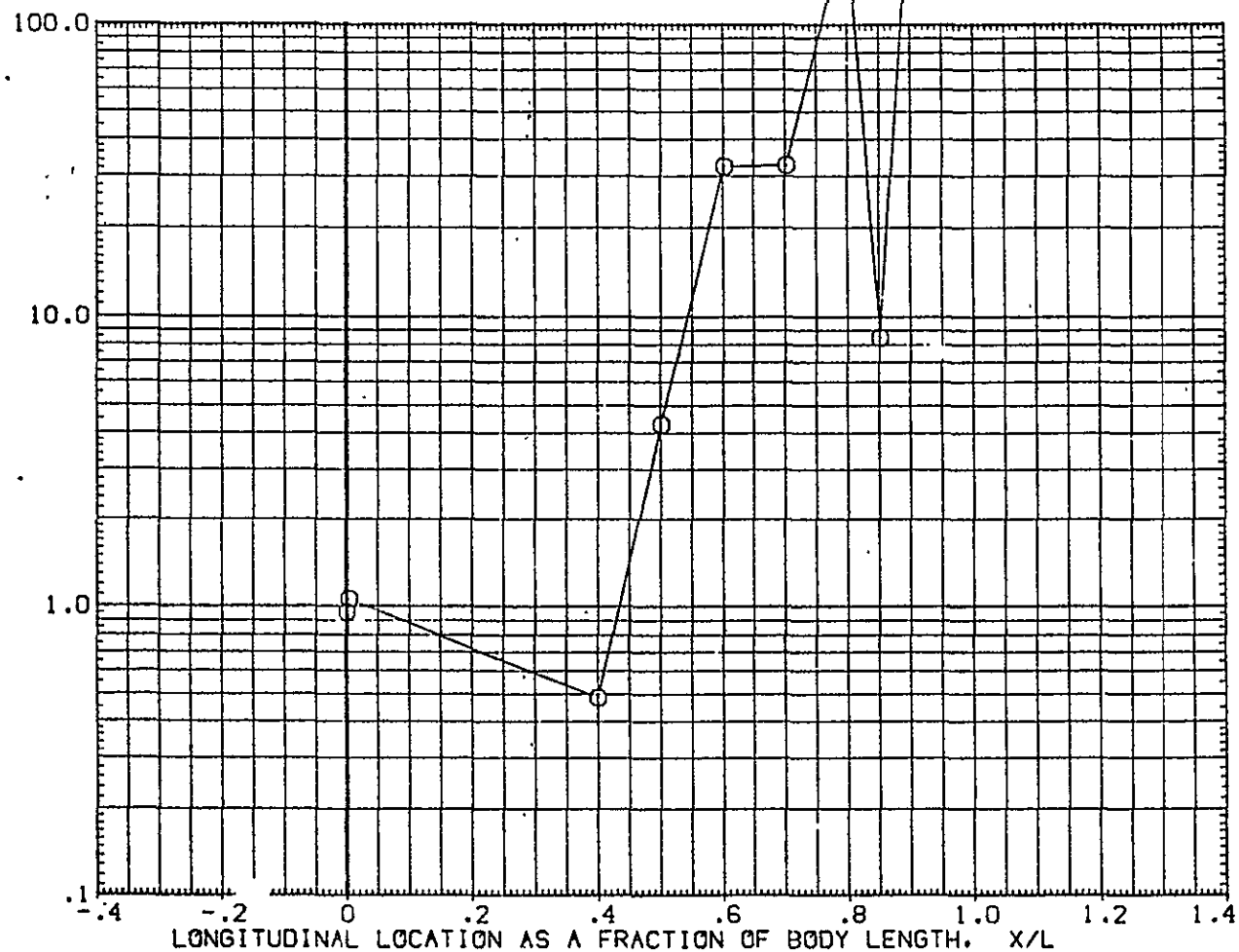


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ $\alpha = 0$

GH12 + 1H21 MODEL 37 9T(05)/T(01) TANK (1UGT05)

| | | | | | | |
|--------|--------|---------|-------|-------------------|------|-----------|
| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
| O | .900 | 241.000 | 7.000 | ALPHA | .000 | BETA .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, H_i/H_u

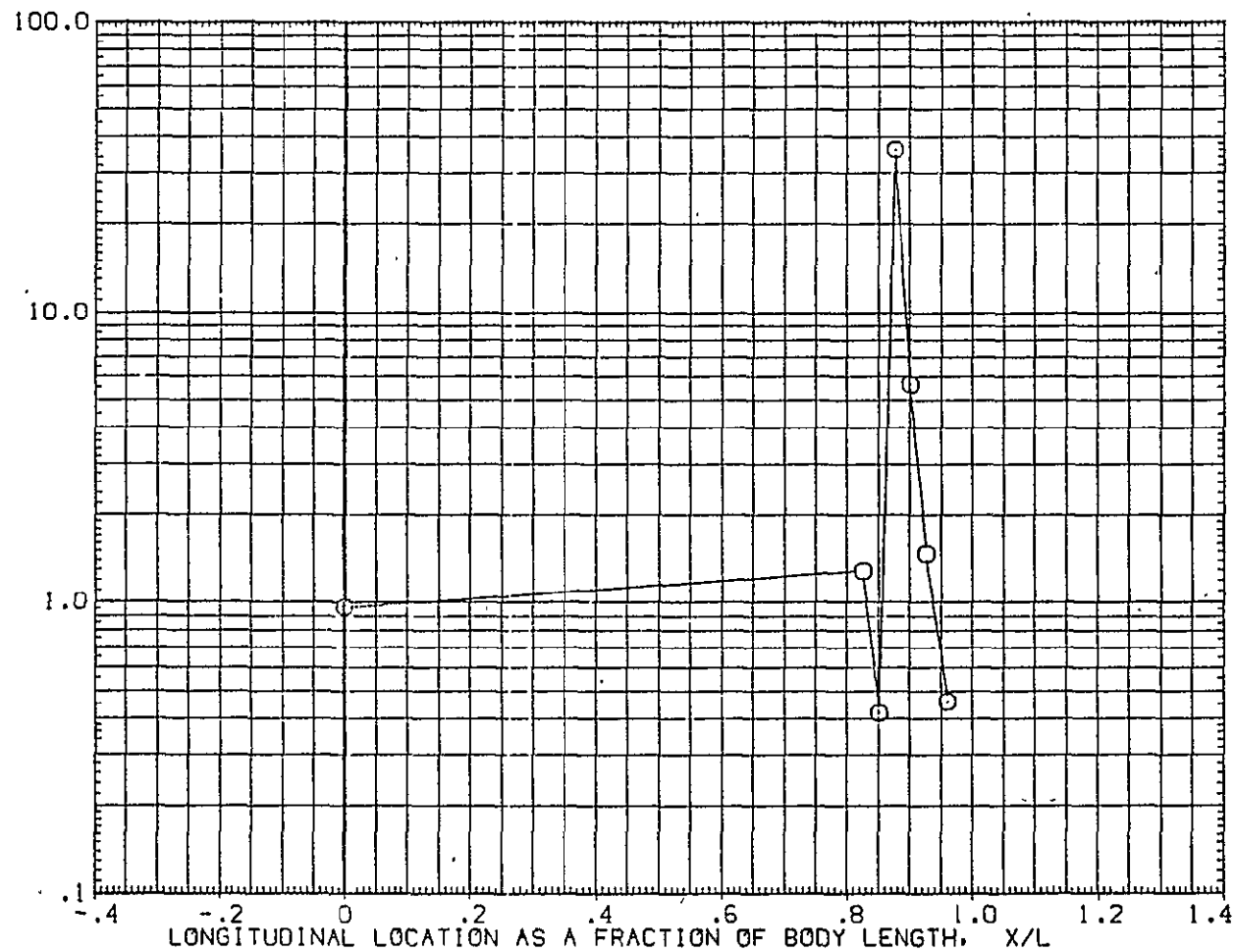


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

| | | | | |
|--------|--------|---------|-------|----------------------|
| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES |
| ○ | .900 | 247.000 | 7.000 | ALPHA .000 BETA .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, h_i/h_u

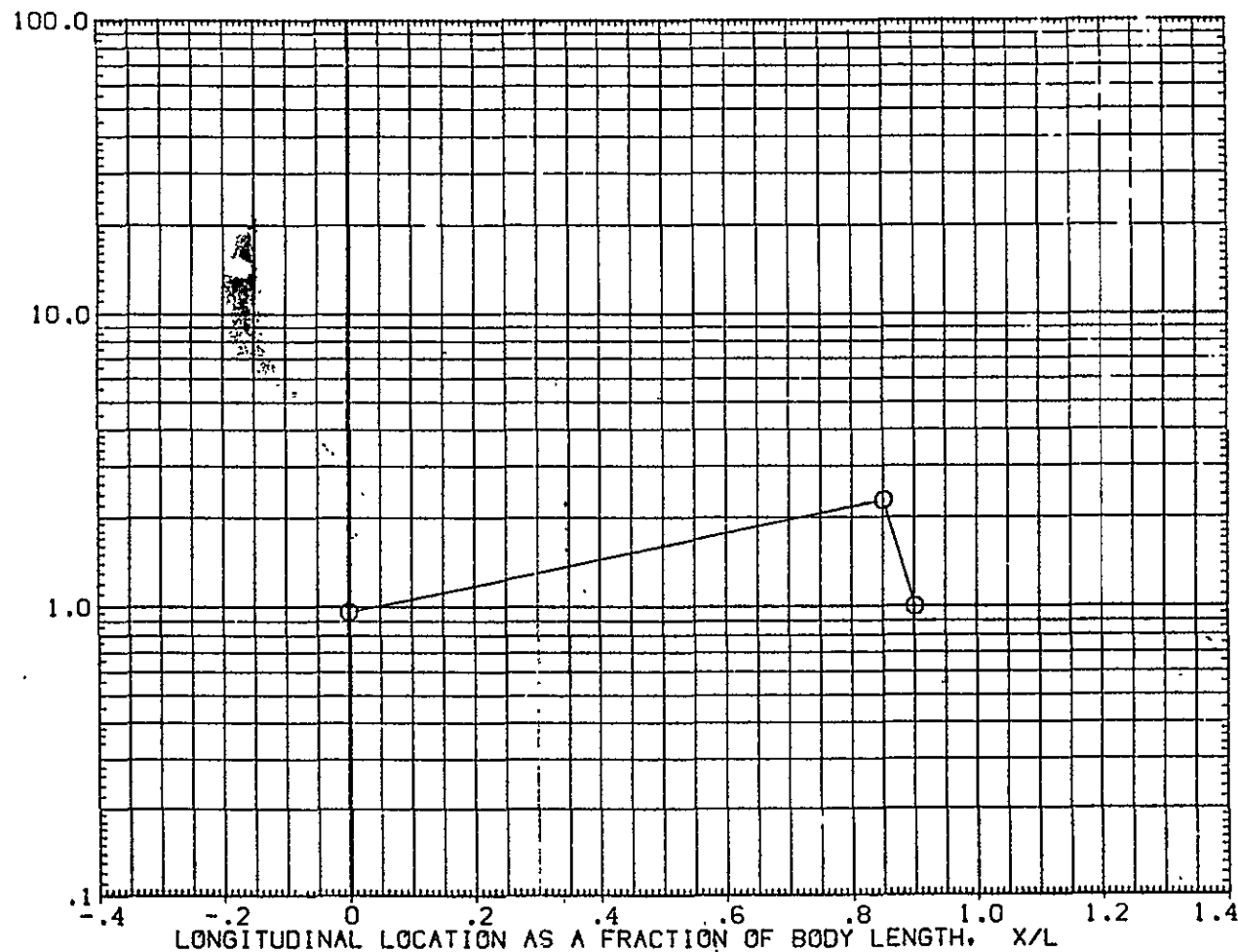


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

OH12 + 1H21 MODEL 37 OT(05)/T(01) TANK (IUGT05)

| | | | | | | | |
|--------|--------|---------|-------|-------|-------------------|------|------|
| SYMBOL | MAV/HT | PHI | YACH | ALPHA | PARAMETRIC VALUES | BETA | |
| ○ | .900 | 270.000 | 7.000 | | .000 | | .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU

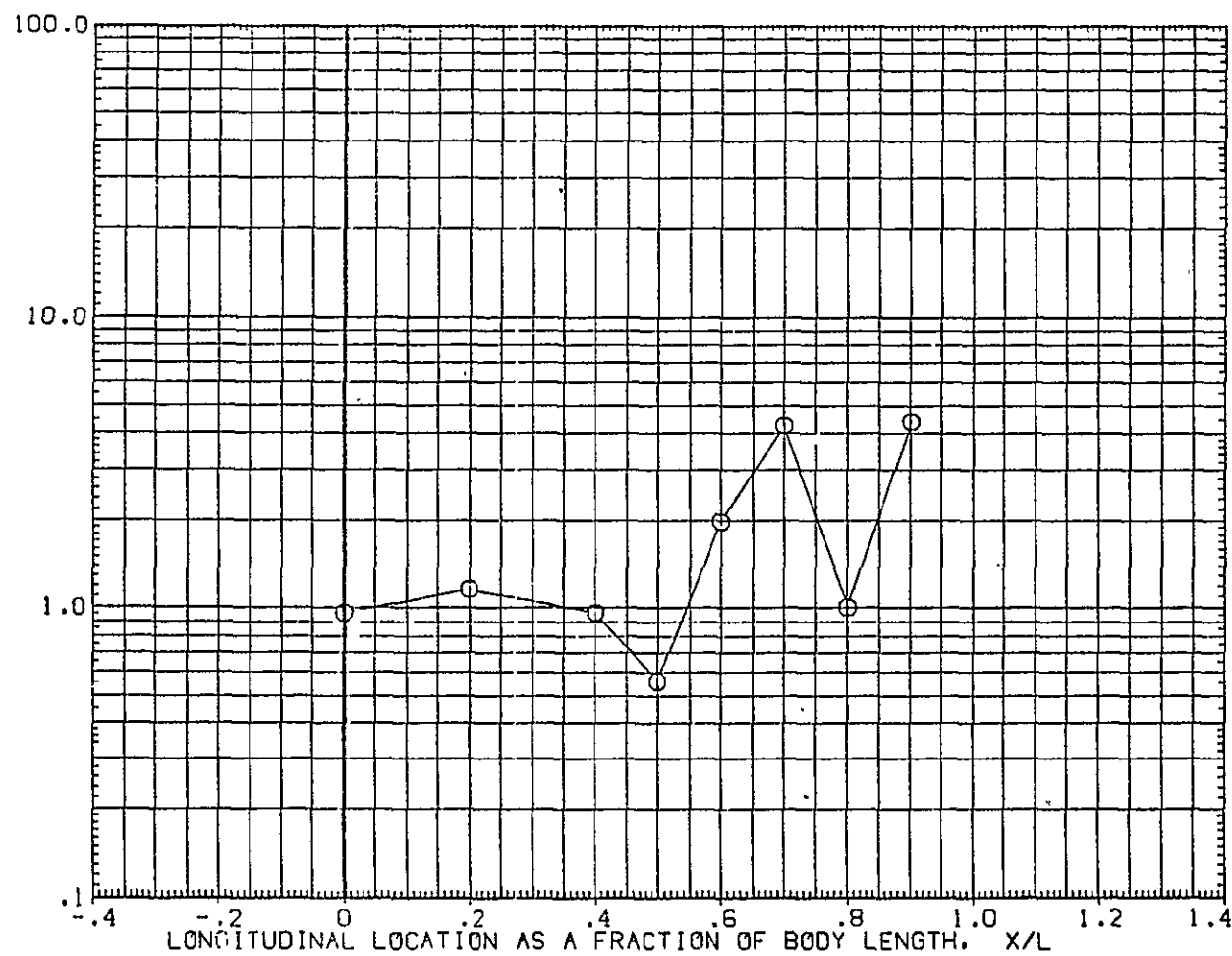


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

OH12 + IH21 MODEL 37 0T(05)/T(01) TANK (IUGT05)

| | | | | | | |
|--------|--------|---------|-------|-------|-------------------|------|
| SYMBOL | HAW/HT | PHI | MACH | ALPHA | PARAMETRIC VALUES | |
| O | .900 | 315.000 | 7.000 | .000 | BETA | .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU

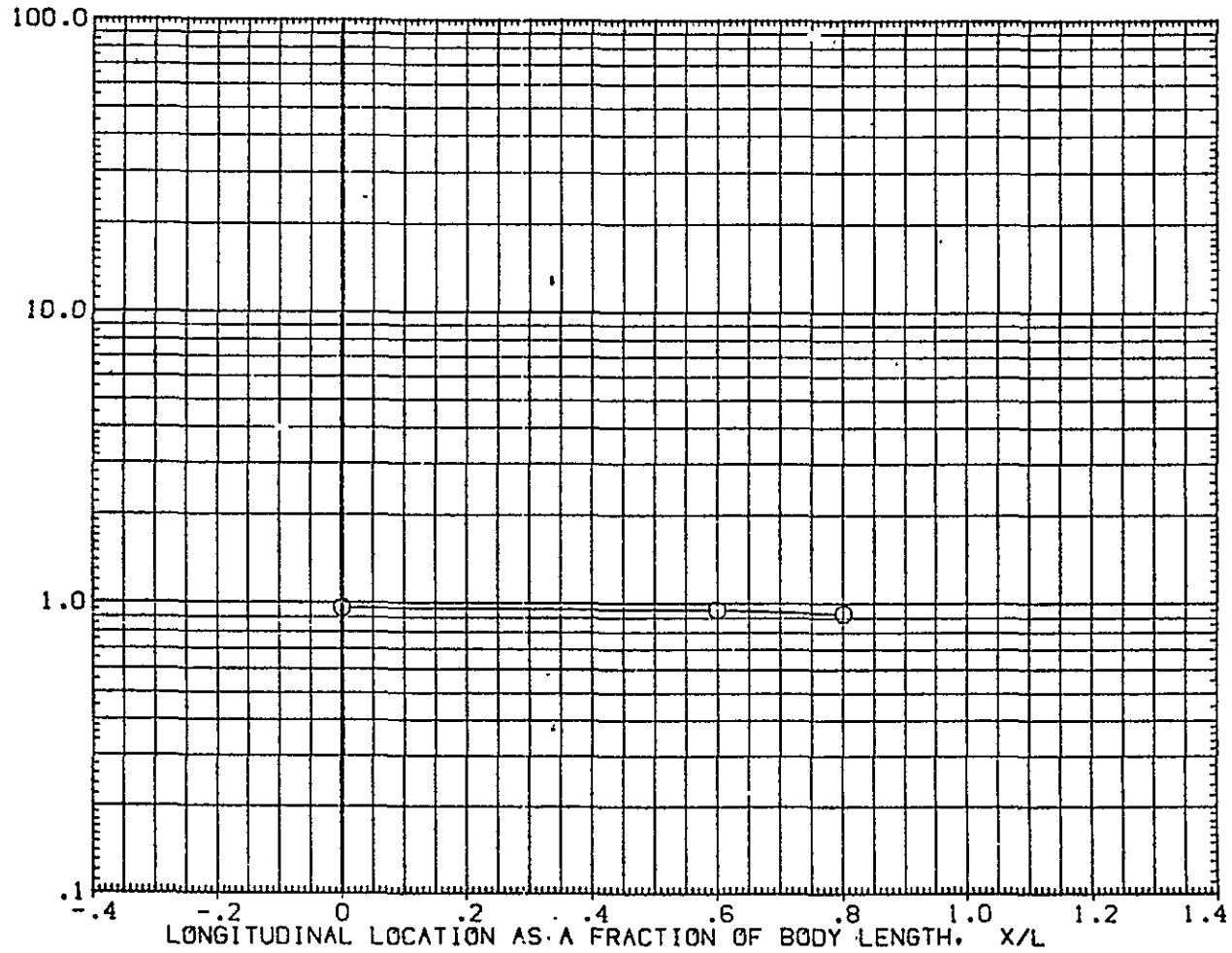


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER RN/LI ALPHA = 0

OH12 + 1H21 MODEL 37 OT(05)/T(01) TANK (1UGT05)

| | | | | | | |
|--------|--------|------|-------|-------|-------------------|------|
| SYMBOL | HAW/HT | PHI | MACH | ALPHA | PARAMETRIC VALUES | |
| ○ | .900 | .000 | 7.610 | .000 | BETA | .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU

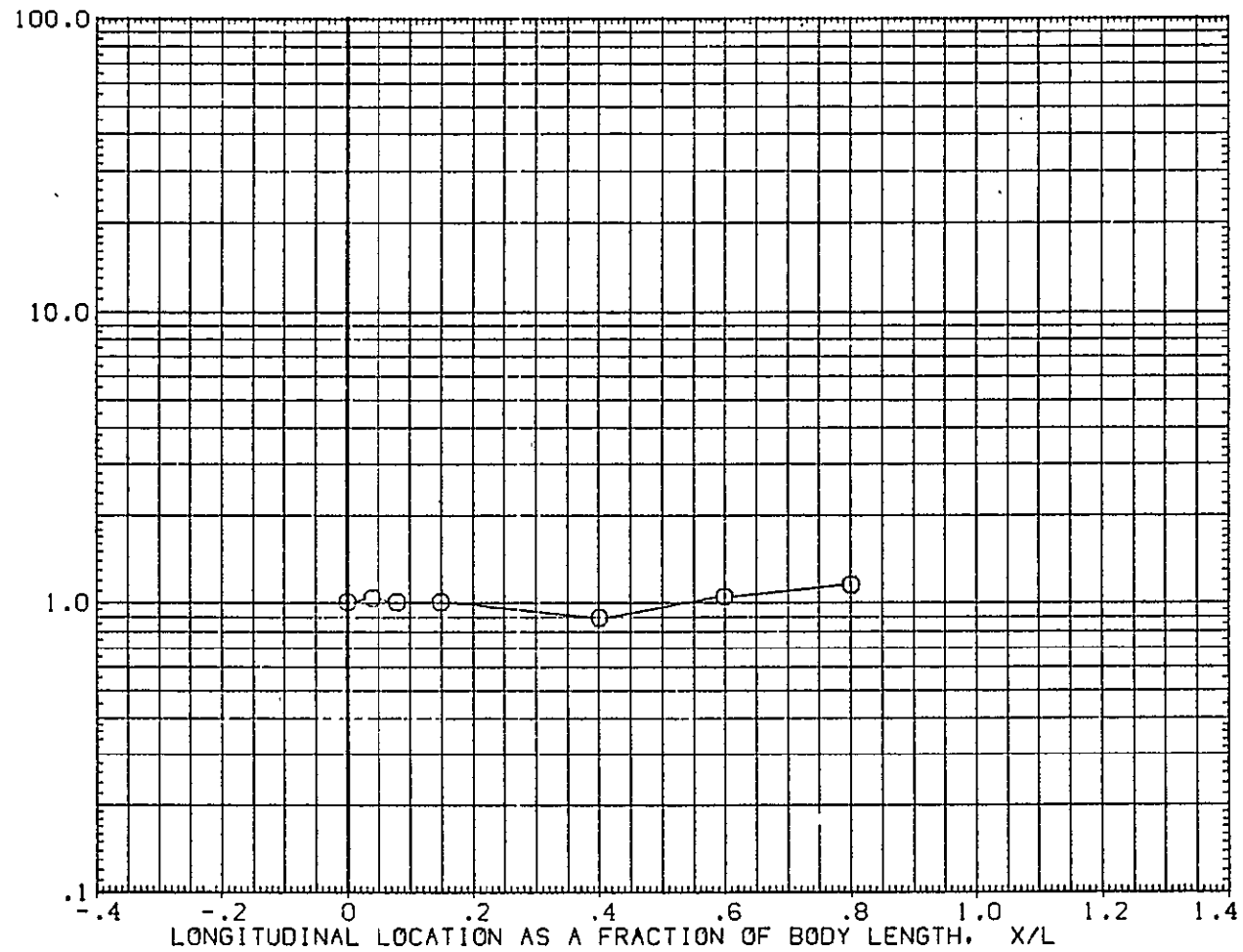


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ $\alpha = 0$

OH12 + IH21 MODEL 37 OT(05)/T(01) TANK (IUGT05)

| | | | | |
|--------|--------|---------|-------|----------------------|
| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES |
| O | .900 | 180.000 | 7.610 | ALPHA .000 BETA .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU

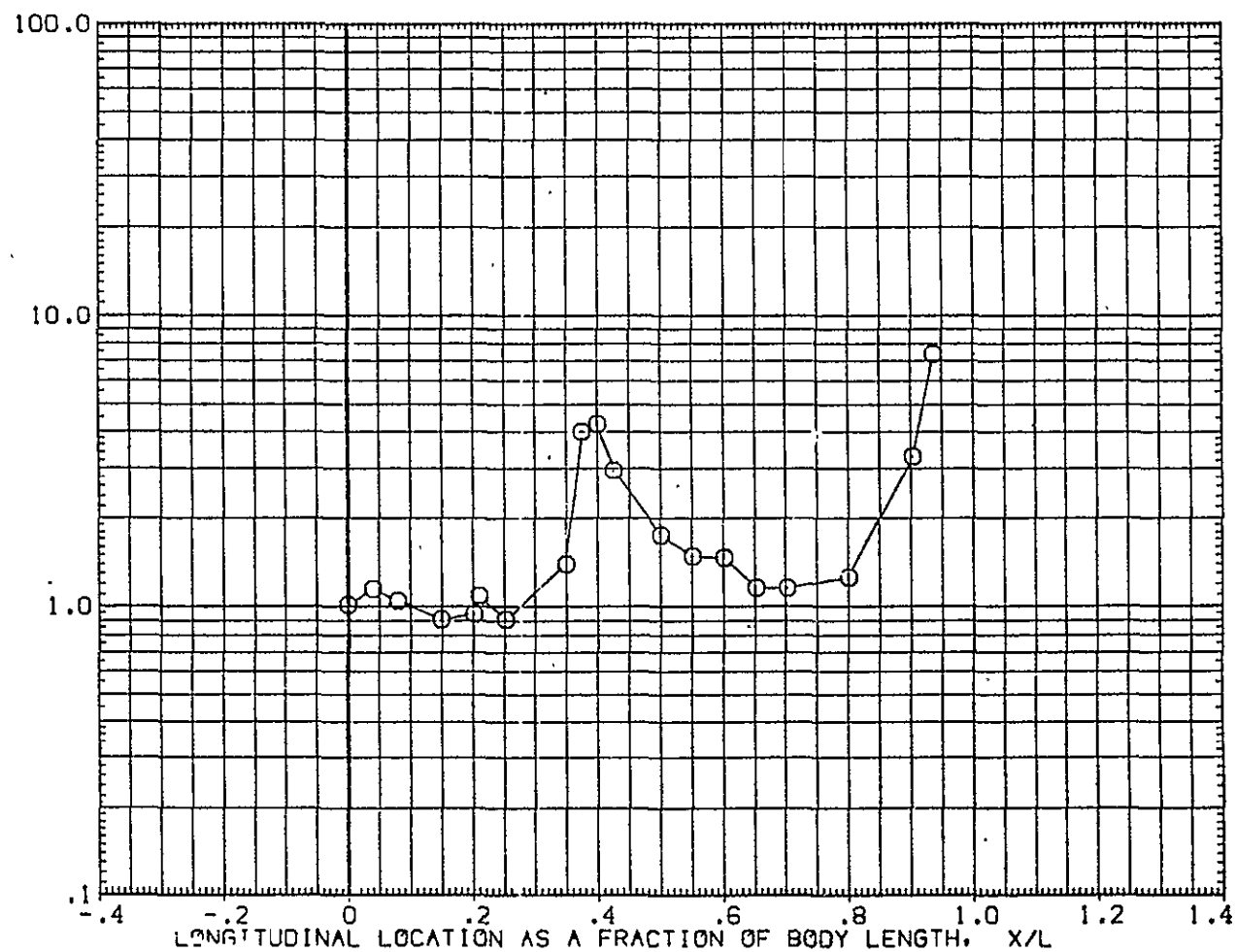


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

OH12 + IH21 MODEL 37 OT(05)/T(01) TANK

(IUGT05)

SYMBOL HAW/HT PH1 MACH
 O .900 199.000 7.610

PARAMETRIC VALUES
 ALPHA .000 BETA .000

RATIO OF INTERFERENCE TO DISTURBED HEAT TRANSFER COEFFICIENT, H_i/H_u

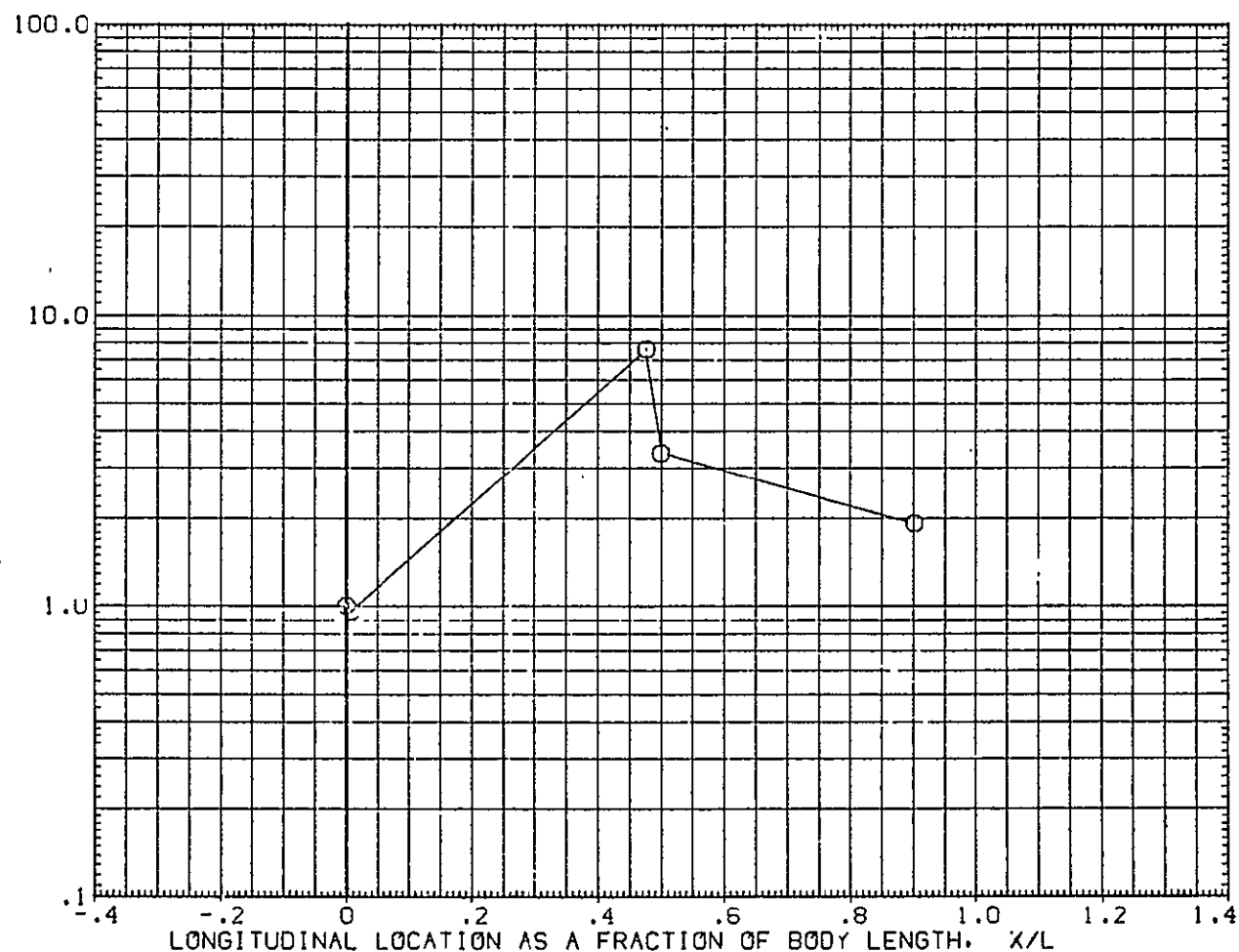


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER RN/L ALPHA = 0

OH12 + IH21 MODEL 37 0T(05)/T(01) TANK (1UGT05)

SYMBOL \bigcirc HAW/HT .900 PHI 221.000 MACH 7.610

PARAMETRIC VALUES
ALPHA .000 BETA .000

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU

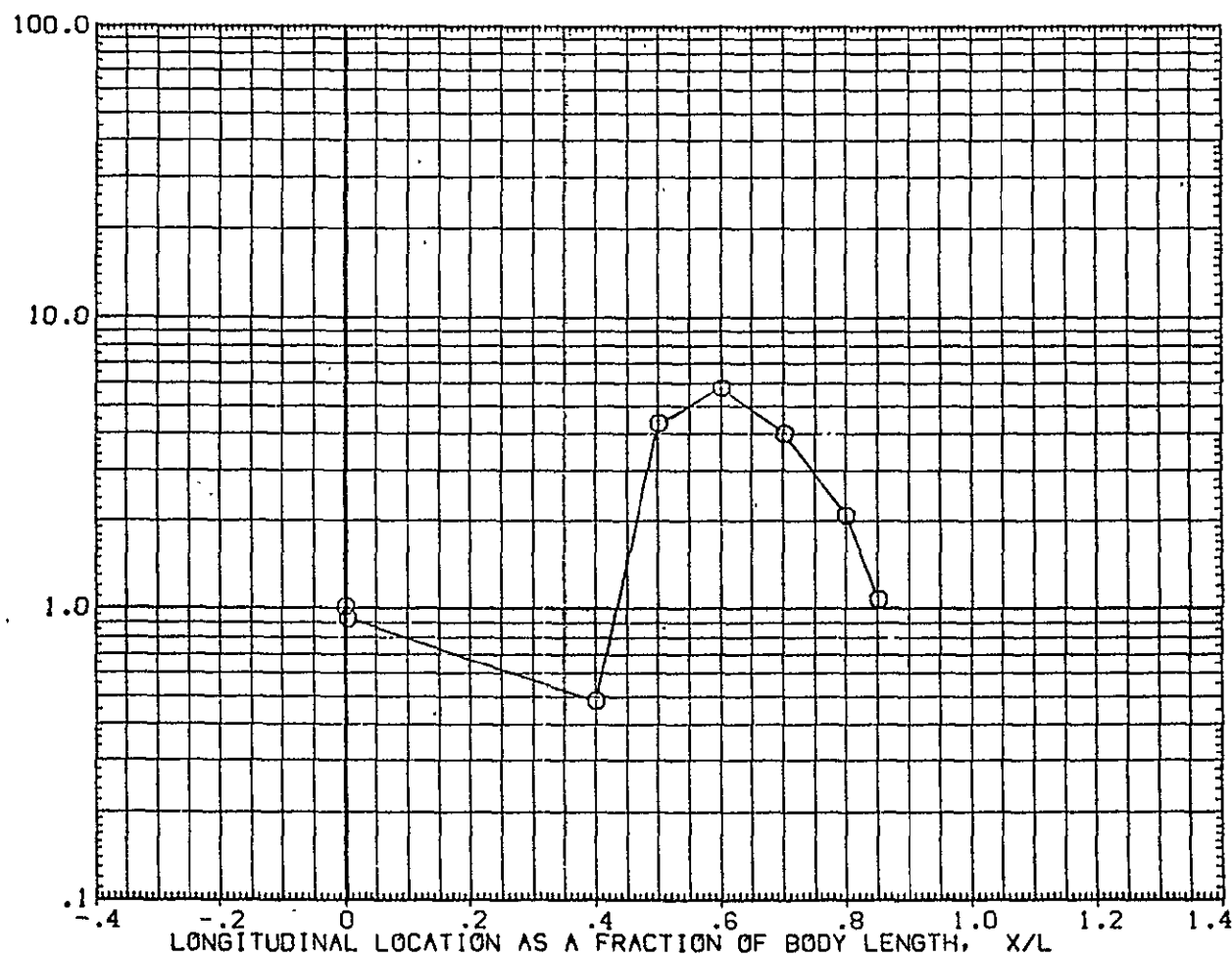


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

OH12 + IH21 MODEL 37 OT(05)/T(01) TANK (1UGT05)

SYMBOL
O
HAW/HT
.900
PHI
241.000
MACH
7.610

PARAMETRIC VALUES
ALPHA
.000
BETA
.000

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU

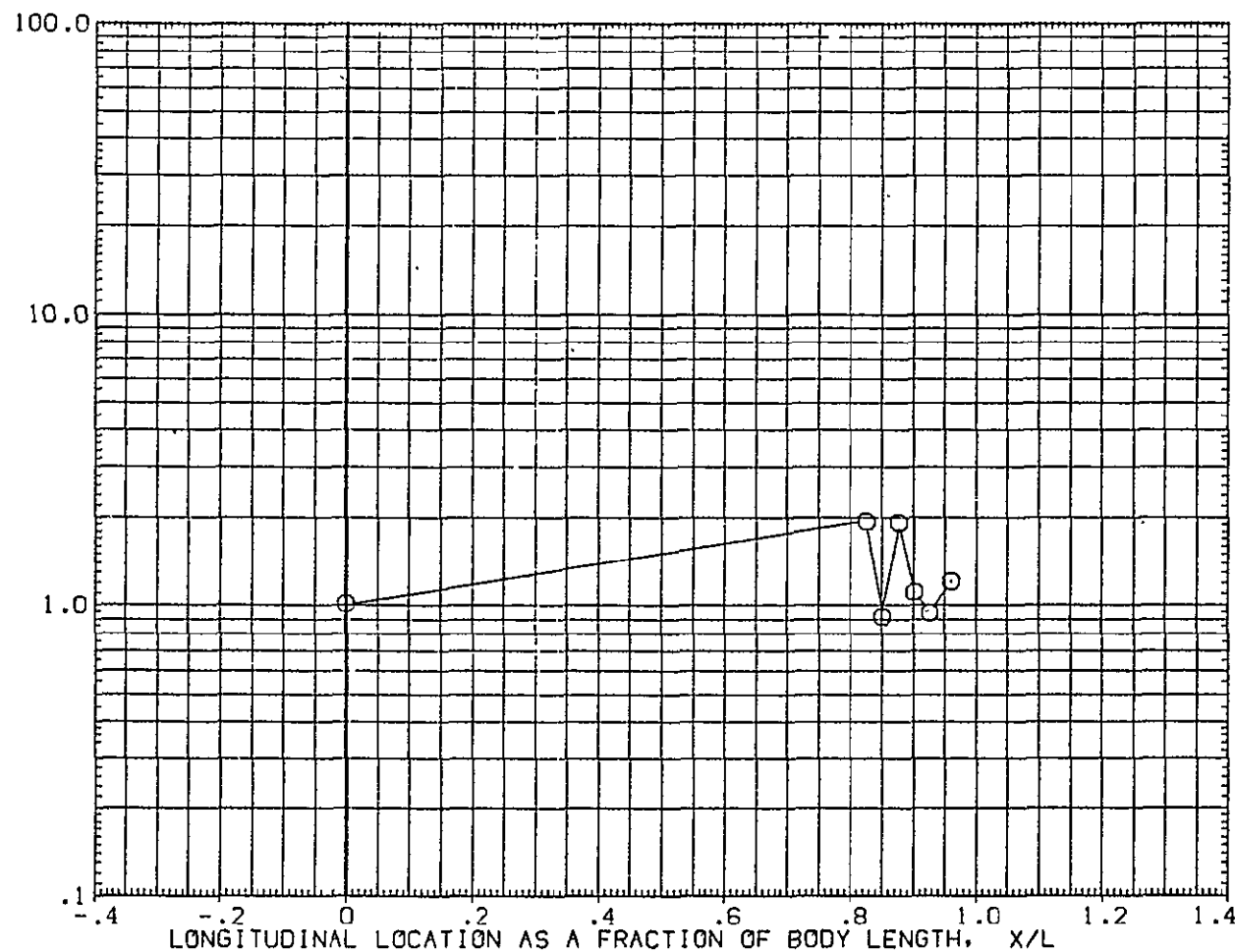


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

GH12 + IH21 MODEL 37 OT(05)/T(01) TANK (1UGT05)

SYMBOL
O
HAW/HT
.900
PHI
247.000
MACH
7.610

PARAMETRIC VALUES
ALPHA
.000
BETA
.000

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU

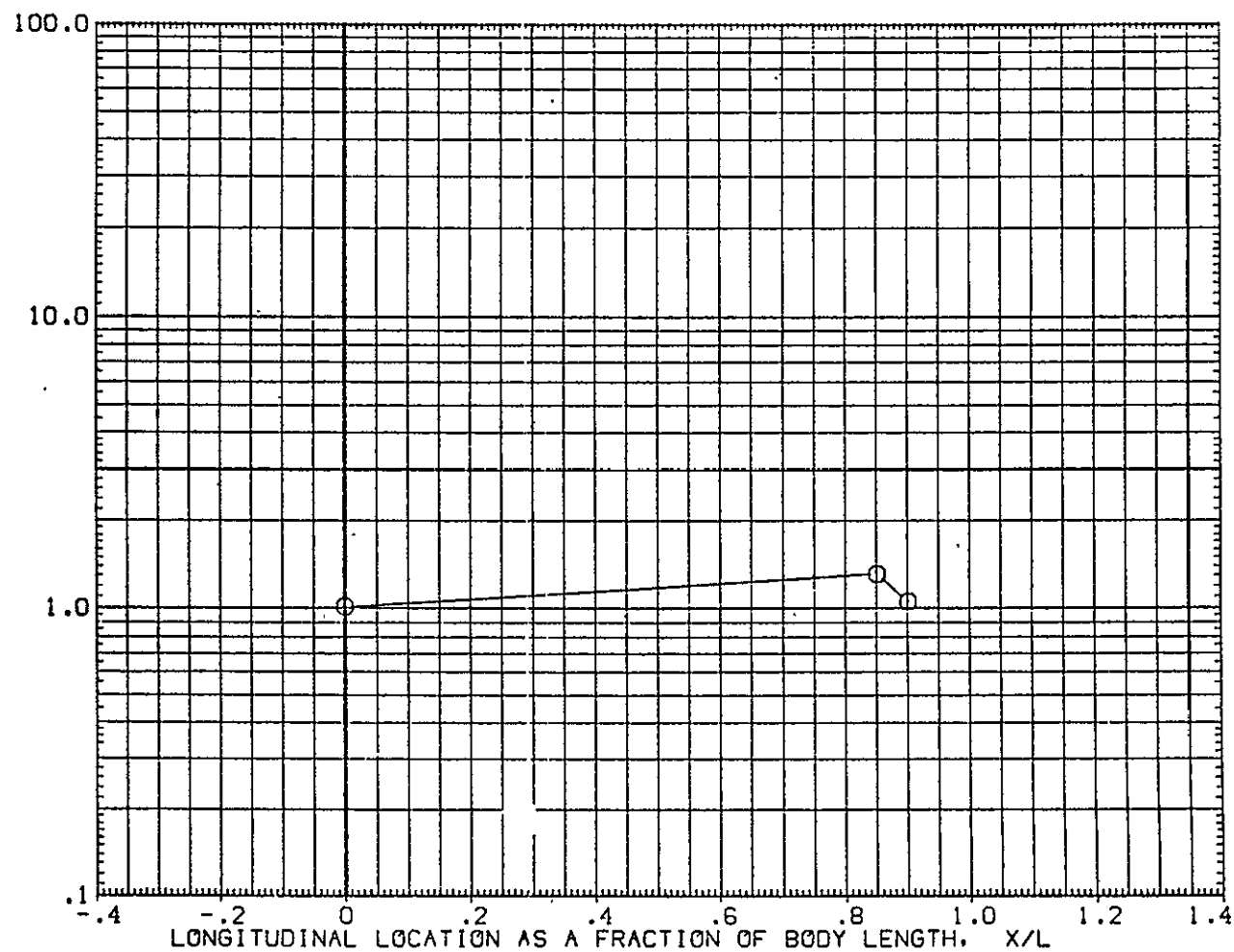


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

OH12 + IH21 MODEL 37 OT(05)/T(01) TANK (IUGT05)

| | | | | | | |
|--------|--------|---------|-------|-------------------|------|-----------|
| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
| O | .900 | 270.000 | 7.610 | ALPHA | .000 | BETA .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, H_i/H_u

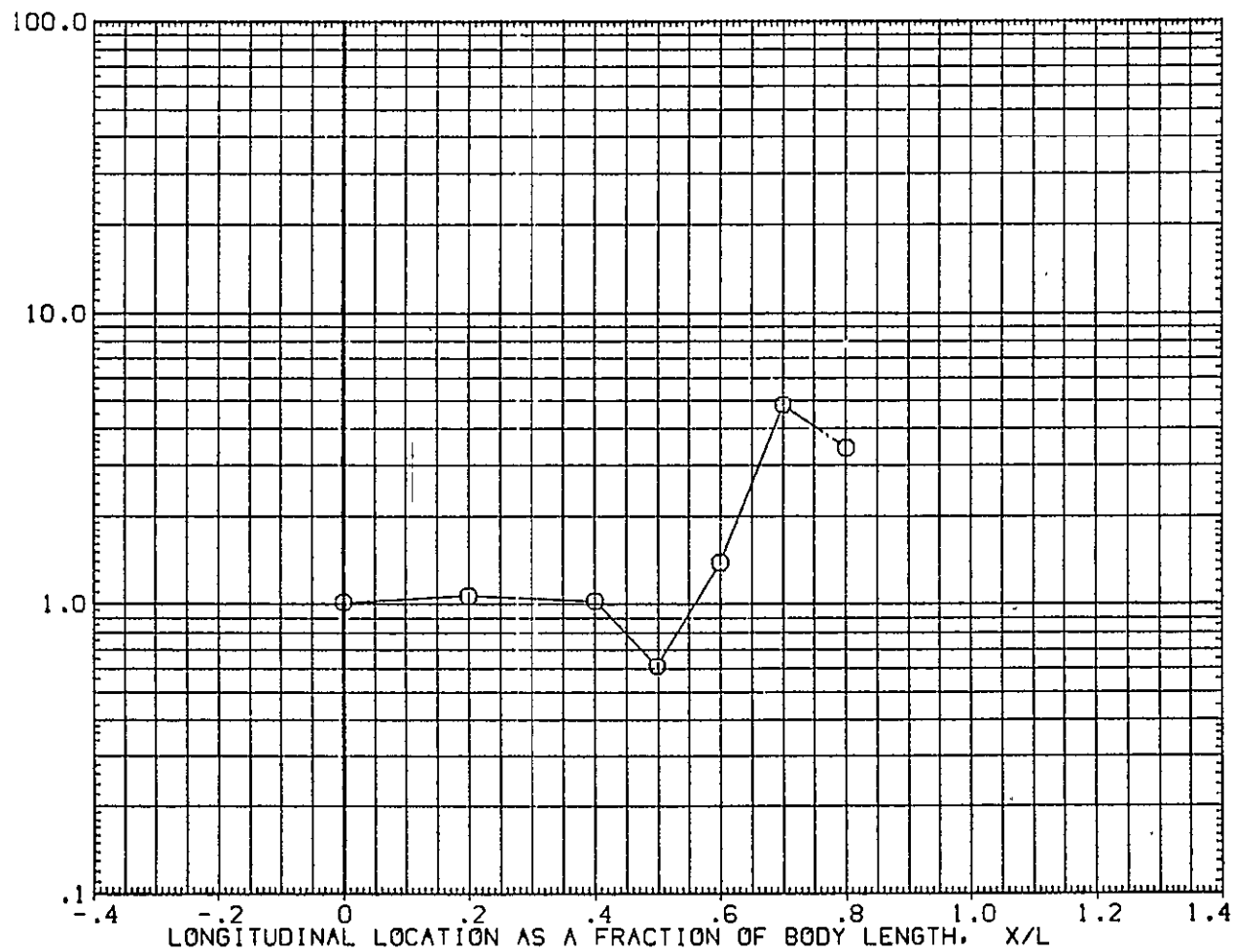


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

0-12 + 1H21 MODEL 37 GT(05)/T(01) TANK (1UGT05)

SYMBOL HAW/HT PHI MACH
 O .900 315.000 7.610

PARAMETRIC VALUES
 ALPHA .000 BETA .000

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU

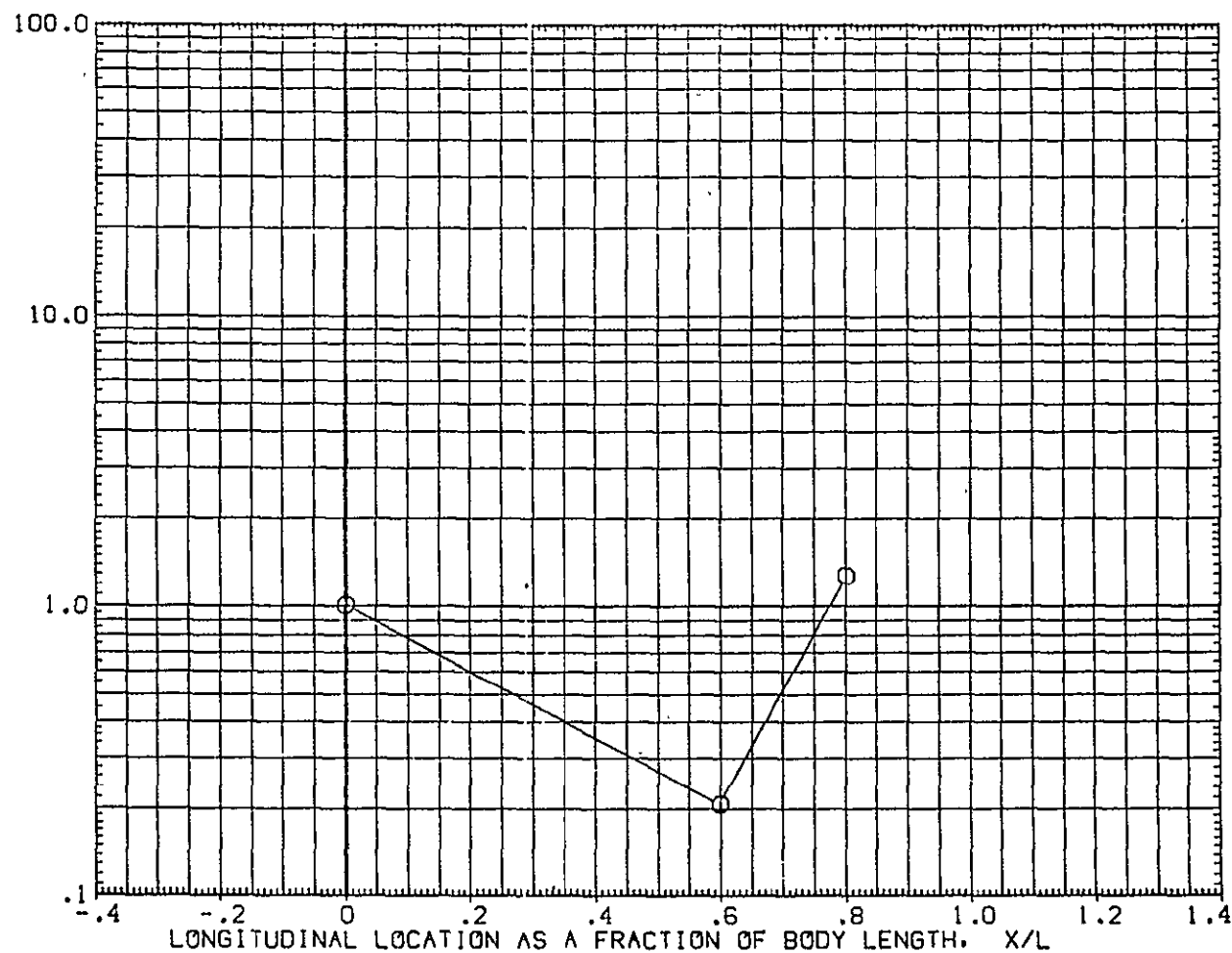


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

OH12 + IH21 MODEL 37 OT(05)/T(01) TANK (IUGT05)

| | | | | | | |
|--------|--------|------|--------|-------|-------------------|------|
| SYMBOL | HAW/HT | PHI | MACH | ALPHA | PARAMETRIC VALUES | |
| ○ | .900 | .000 | 18.300 | .000 | BETA | .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU

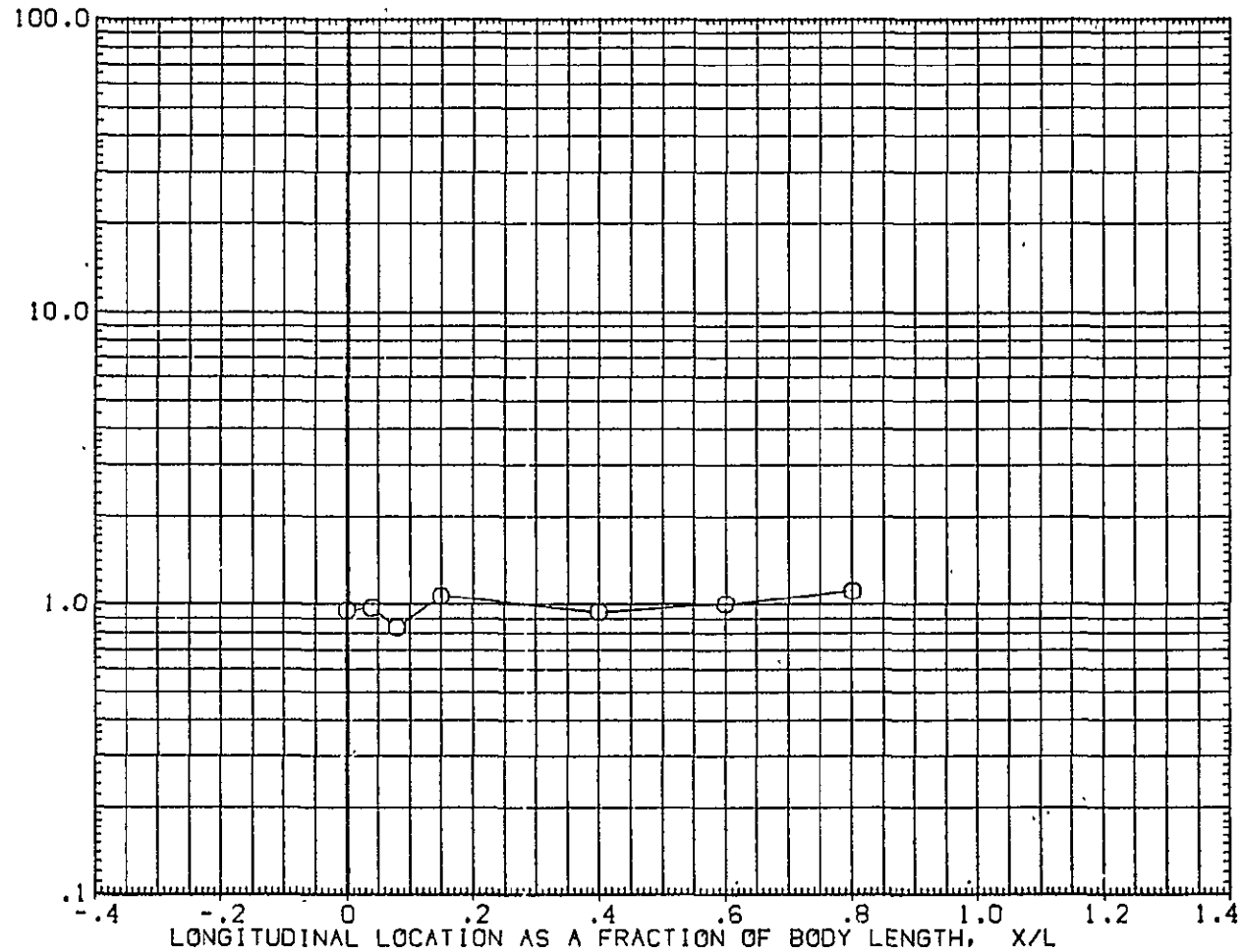


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

OH12 + IH21 MODEL 37 OT(05)/T(01) TANK (1UGT05)

| | | | | |
|--------|--------|---------|--------|----------------------|
| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES |
| ○ | .900 | 180.000 | 18.300 | ALPHA .000 BETA .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU

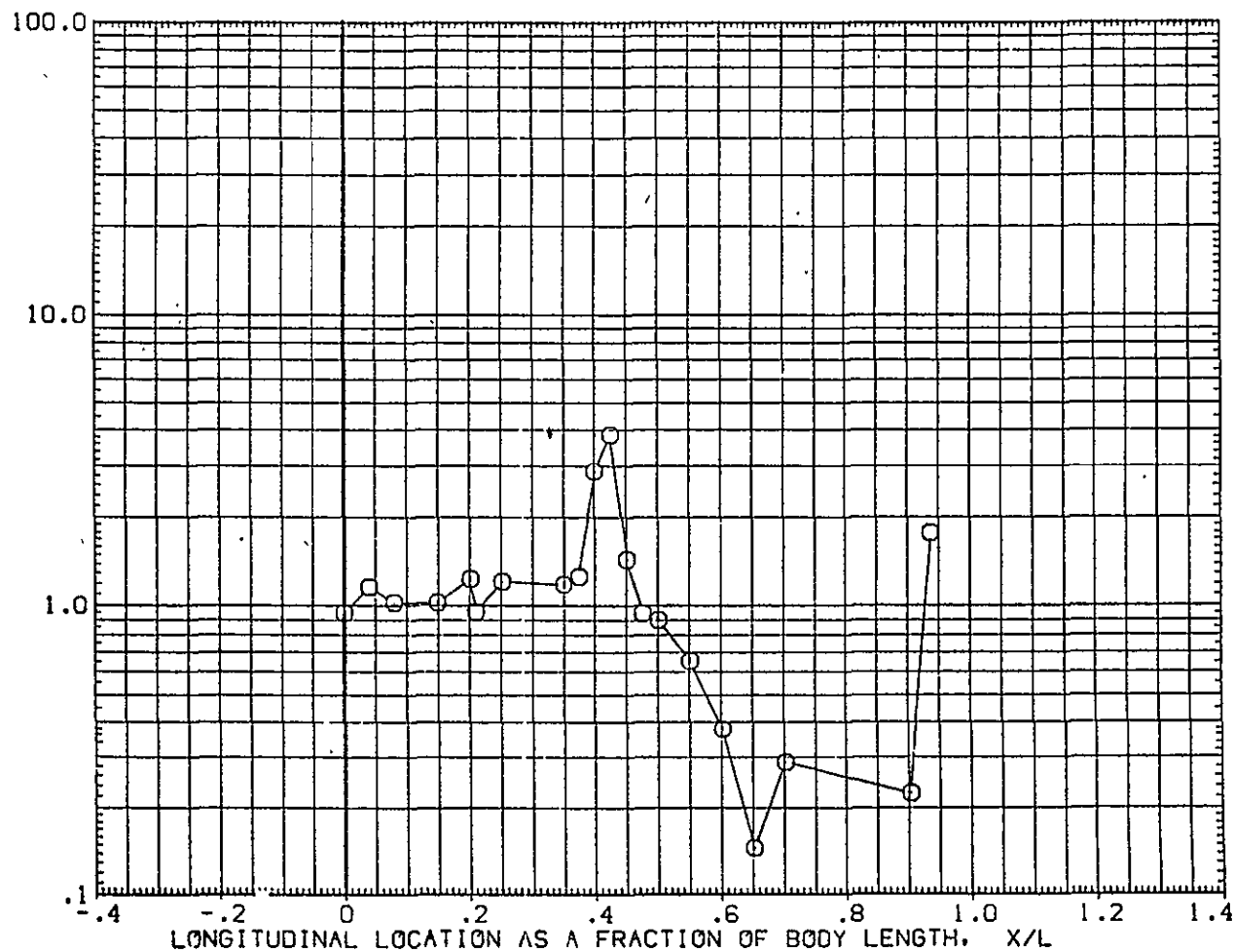


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

OH12 + IH21 MODEL 37 OT(05)/T(01) TANK (IUGT05)

| | | | | | | |
|--------|--------|---------|--------|-------------------|------|-----------|
| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
| O | .900 | 199.000 | 18.300 | ALPHA | .000 | BETA .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU

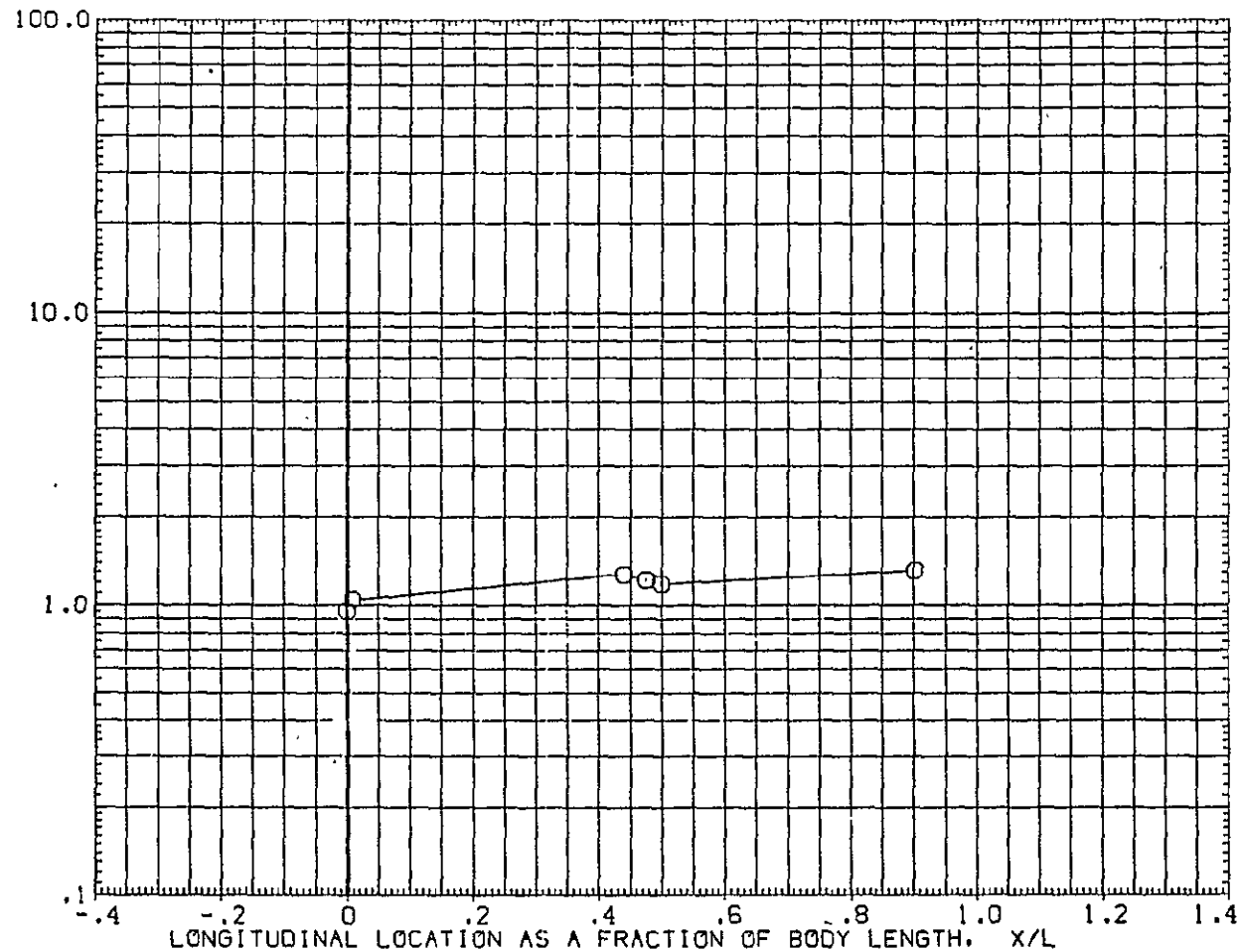


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR

0H12 + 1H21 MODEL 37 0T(05)/T(01) TANK (IUGT05)

| | | | | | | |
|--------|--------|---------|--------|-------------------|------|-----------|
| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
| ○ | .900 | 221.000 | 18.300 | ALPHA | .000 | BETA .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, H_i/H_u

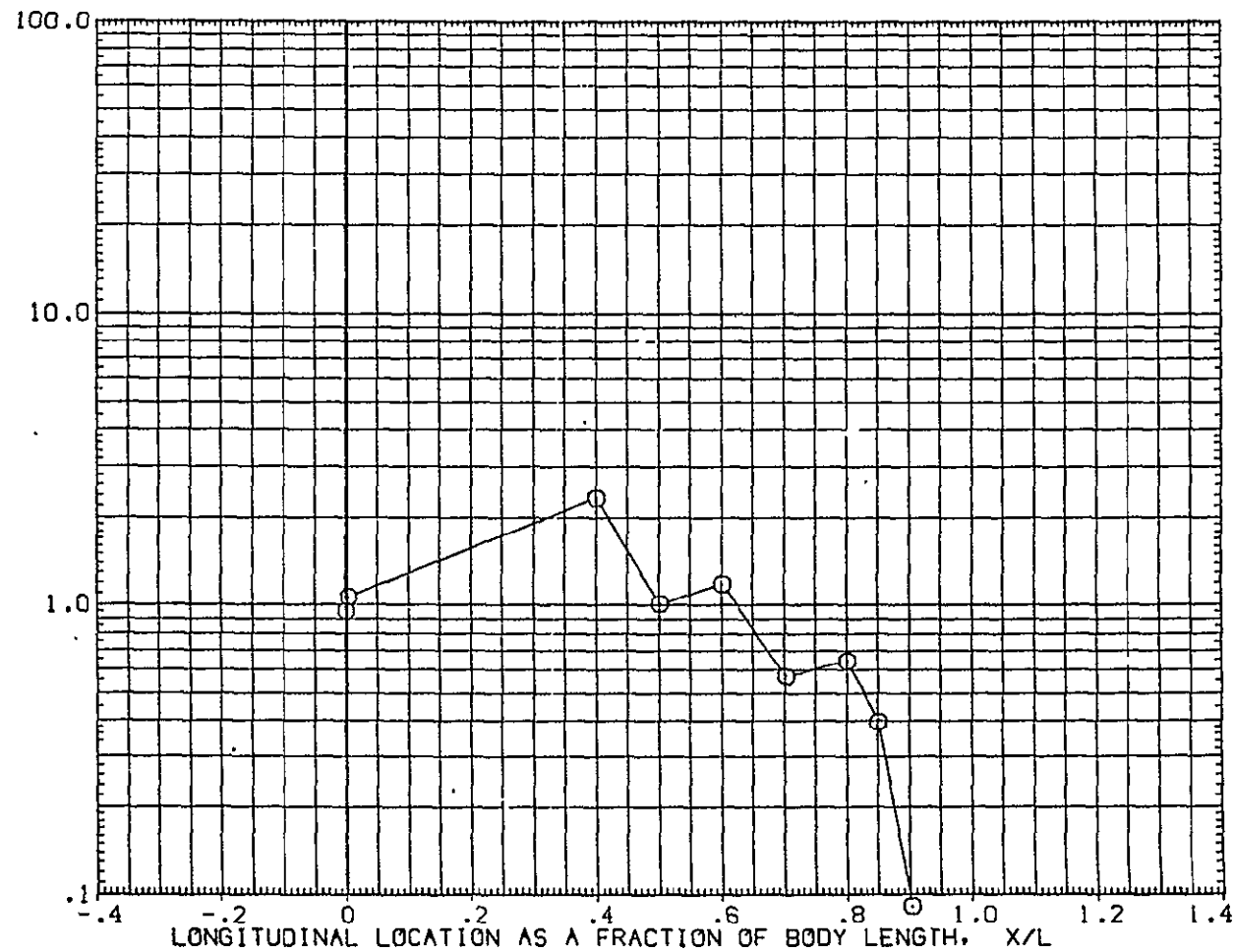


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

OH12 + 1421 MODEL 37 OT(05)/T(01) TANK (1UGT05)

| | | | | | | |
|--------|--------|---------|--------|-------------------|------|-----------|
| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
| ○ | .900 | 241.000 | 19.300 | ALPHA | .000 | BETA .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU

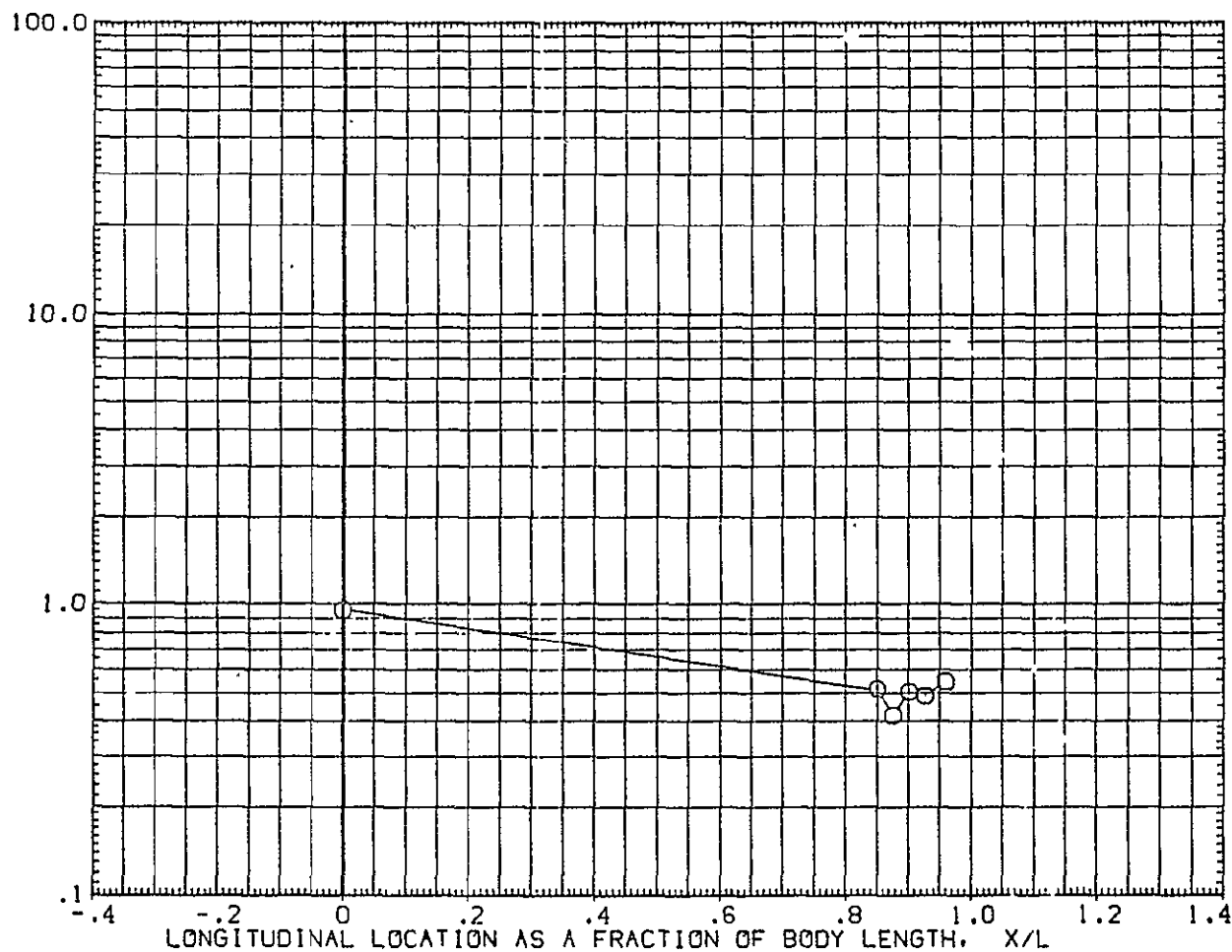


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

CH12 + IH21 MODEL 37 OT(05)/T(01) TANK (IUGT05)

SYMBOL
O
HAW/HT
.900
PHI
247.000
PACW
18.300

PARAMETRIC VALUES
ALPHA
.000
BETA
.000

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU

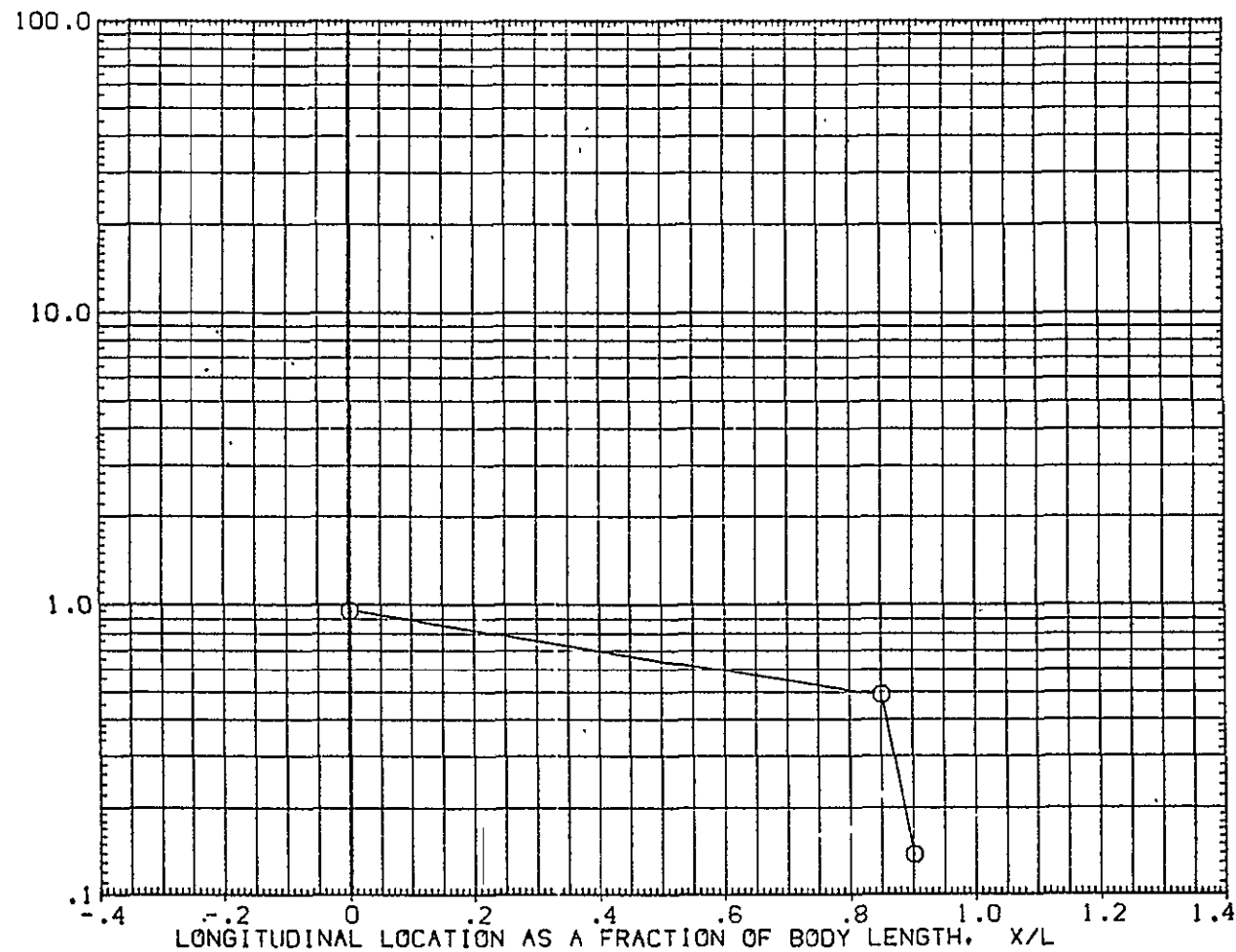


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

0H12 + [H2] MODEL 37 0T(05)/T(0) TANK (1UGT05)

| | | | | | | | |
|--------|--------|---------|--------|-------------------|------|------|------|
| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | | |
| ○ | .900 | 270.000 | 18.300 | ALPHA | .000 | BETA | .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU

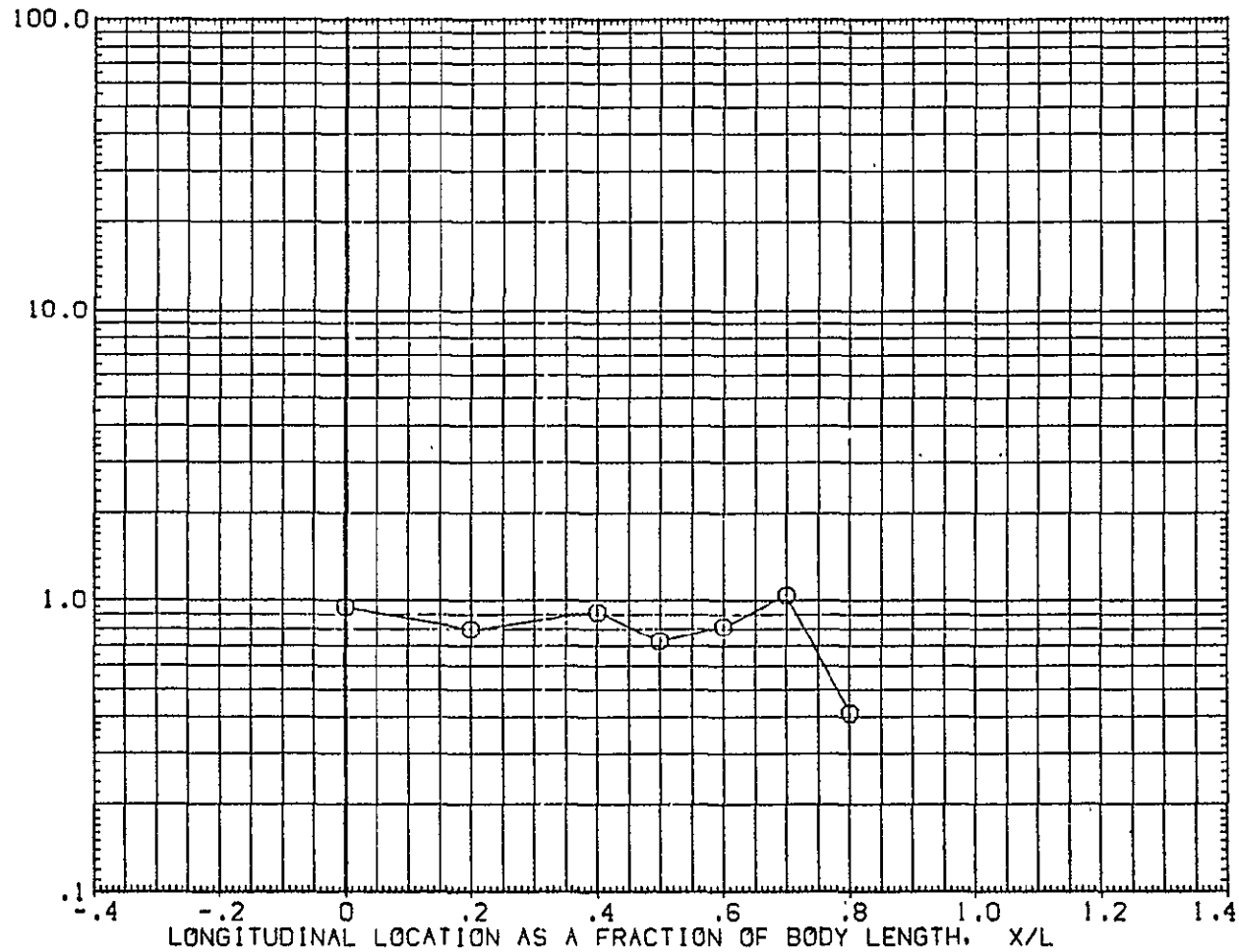


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

0H12 + 1H21 MODEL 37. 0T(05)/T(01) TANK (1UGT05)

| | | | | | | |
|--------|--------|---------|--------|-------|-------------------|-----------|
| SYMBOL | HAW/HT | PHI | MACH | ALPHA | PARAMETRIC VALUES | |
| ○ | .900 | 315.000 | 18.300 | | .000 | BETA .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT. HI/HU

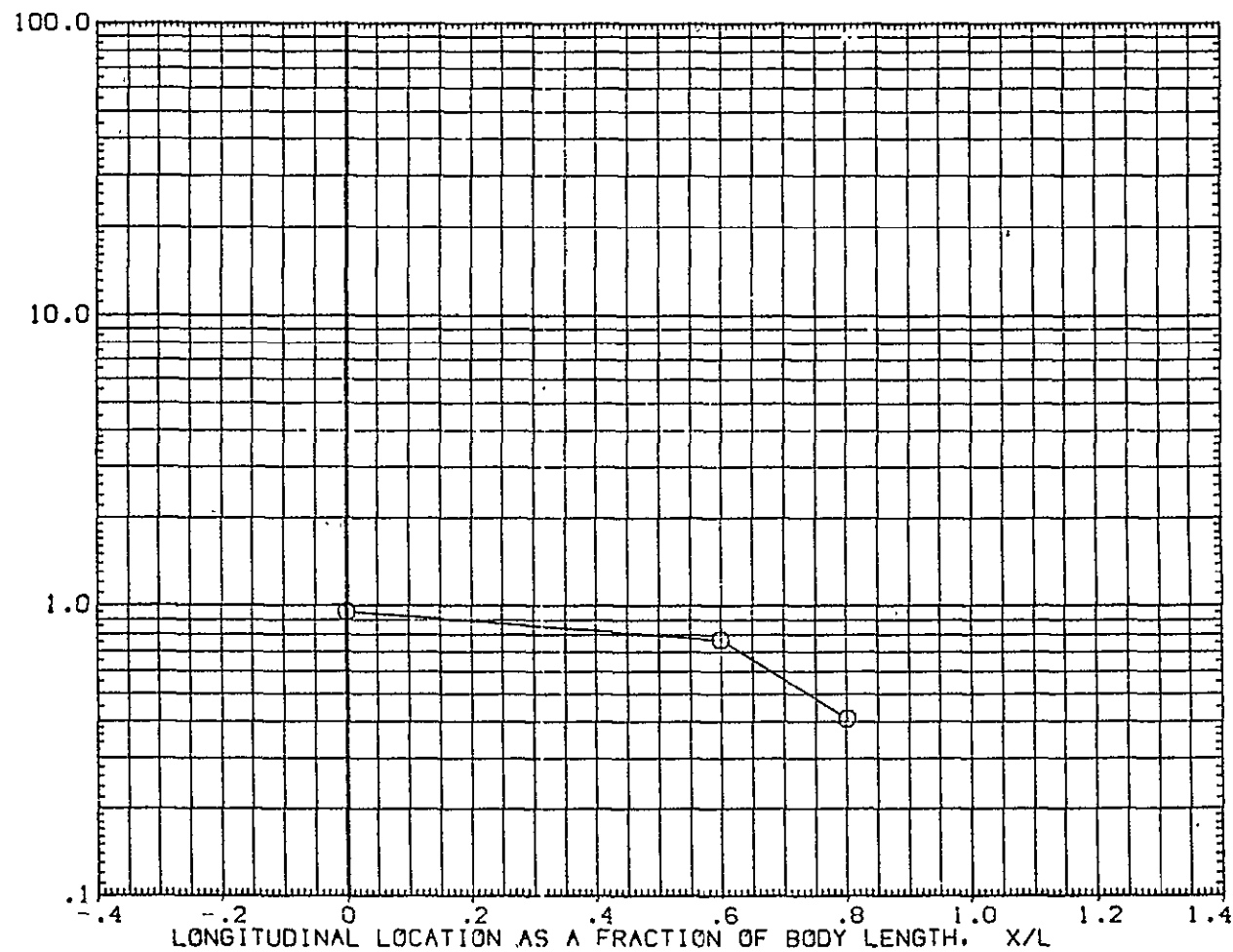


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

0H12 + 1H21 MODEL 37 0T(05)/T(01) TANK (1UGT05)

| | | | | | | |
|--------|--------|------|--------|-------------------|------|-----------|
| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
| ○ | .900 | .000 | 19.180 | ALPHA | .000 | BETA .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU

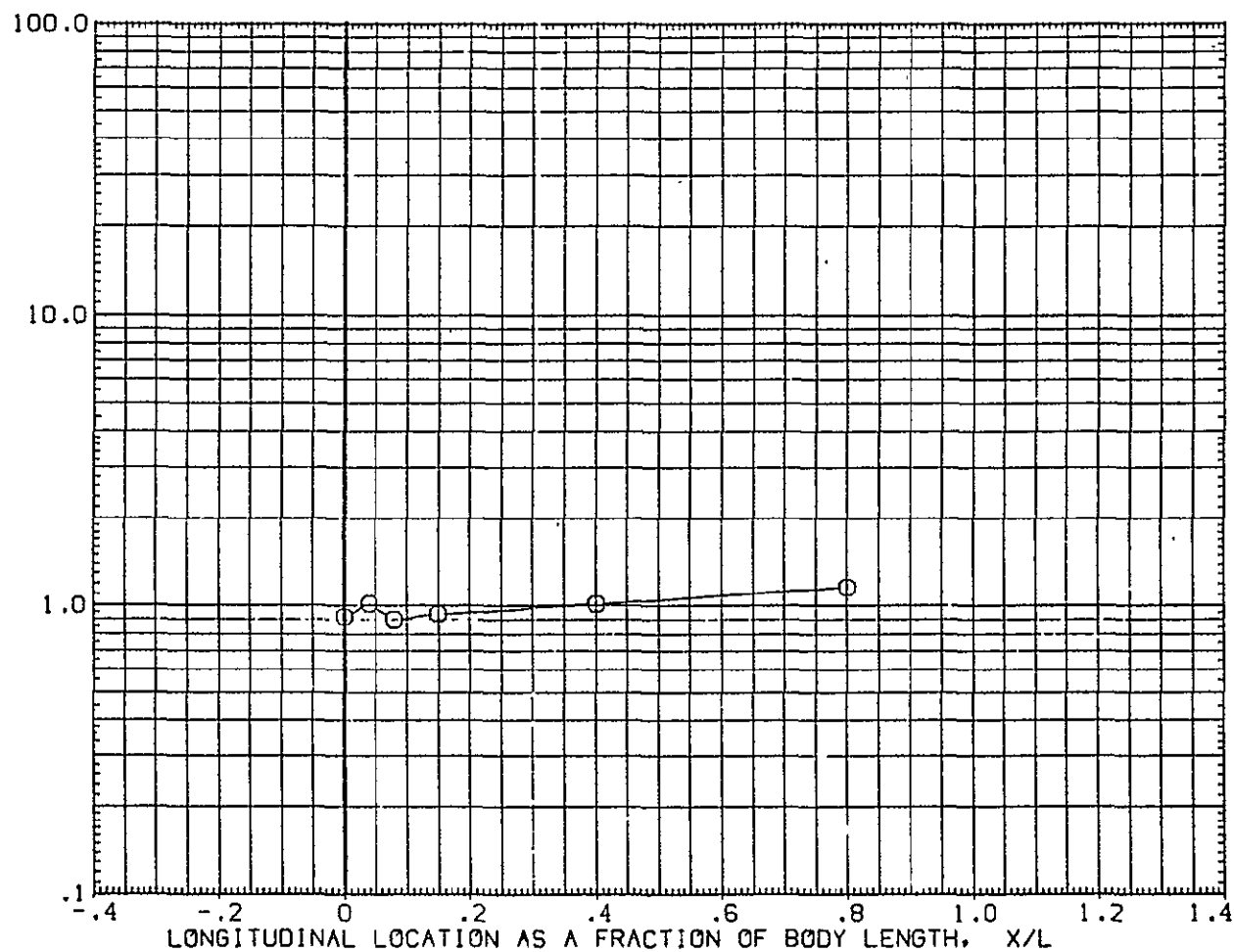


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, h_i/h_u

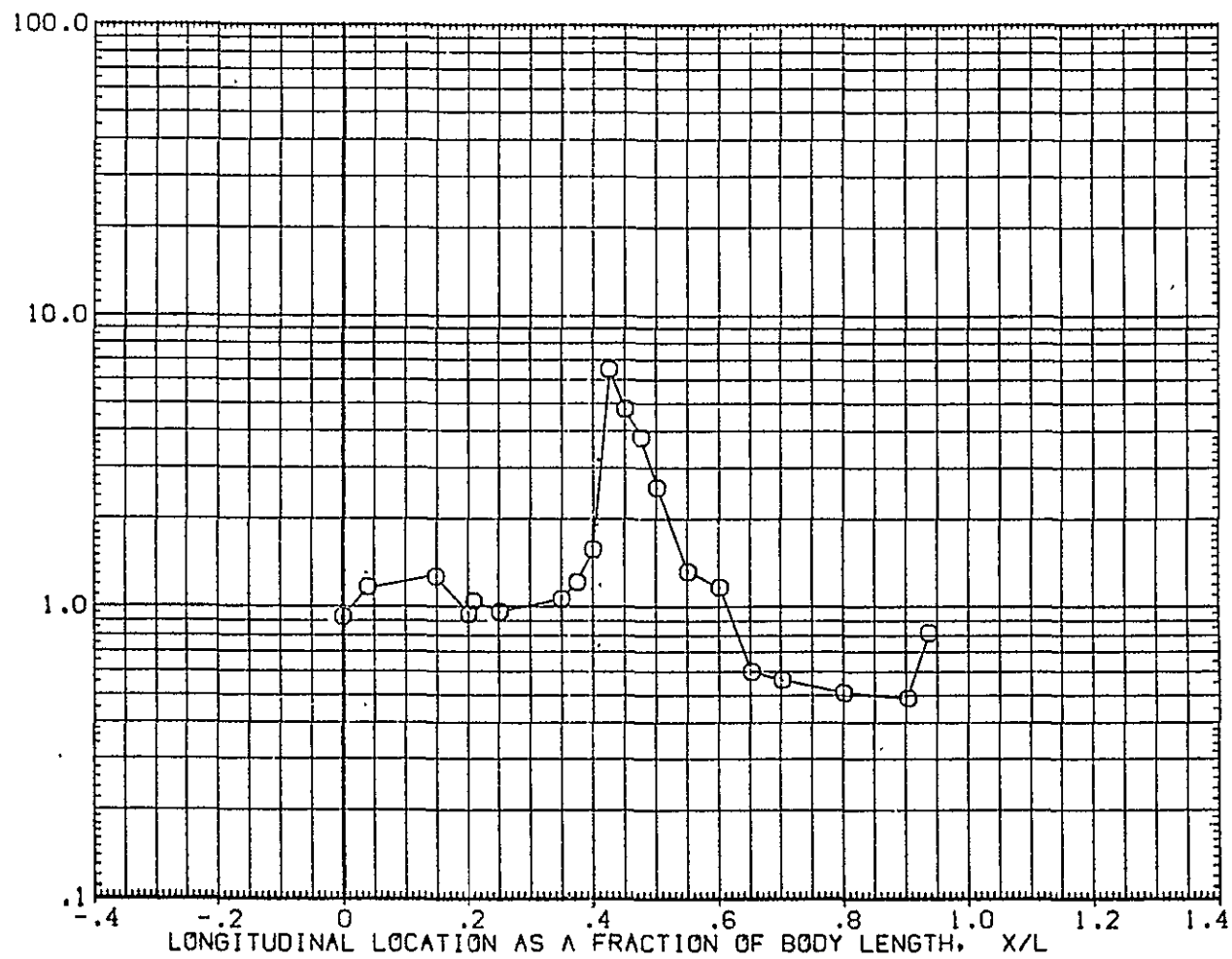


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER RN/L $\alpha = 0$

0H12 + 1H21 MODEL 37 OT(05)/T(01) TANK (1UGT05)

| | | | | |
|--------|--------|---------|--------|----------------------|
| SYMBOL | MAY/HT | PHI | MACH | PARAMETRIC VALUES |
| ○ | .900 | 199.000 | 19.180 | ALPHA .000 BETA .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU

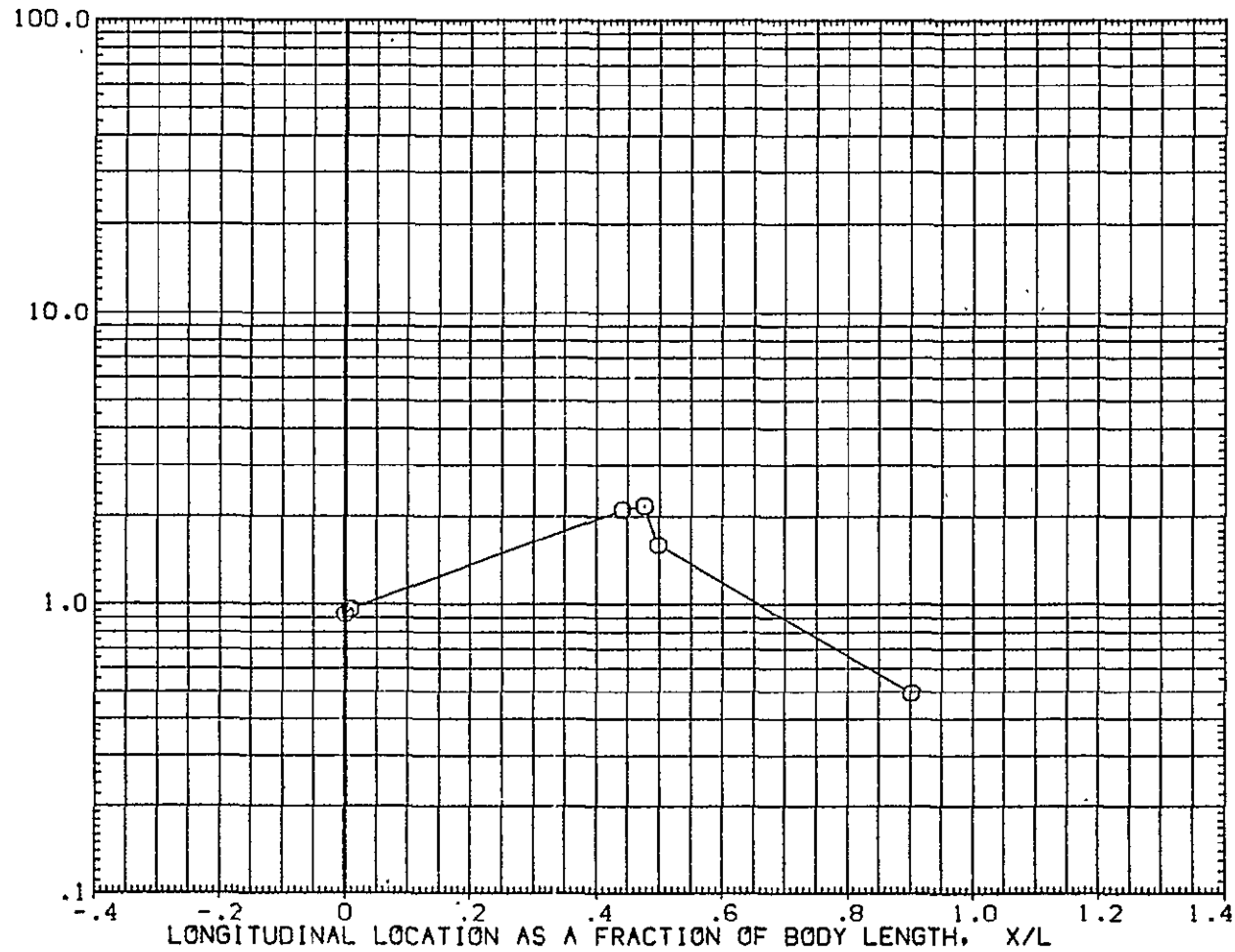


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

OH12 + IH21 MODEL 37 OT(05)/T(01) TANK (IUGT05)

SYMBOL
O
HAW/HT .900
PHI 221.000
MACH 19.180

PARAMETRIC VALUES
ALPHA .000
BETA .000

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, H_1/H_U

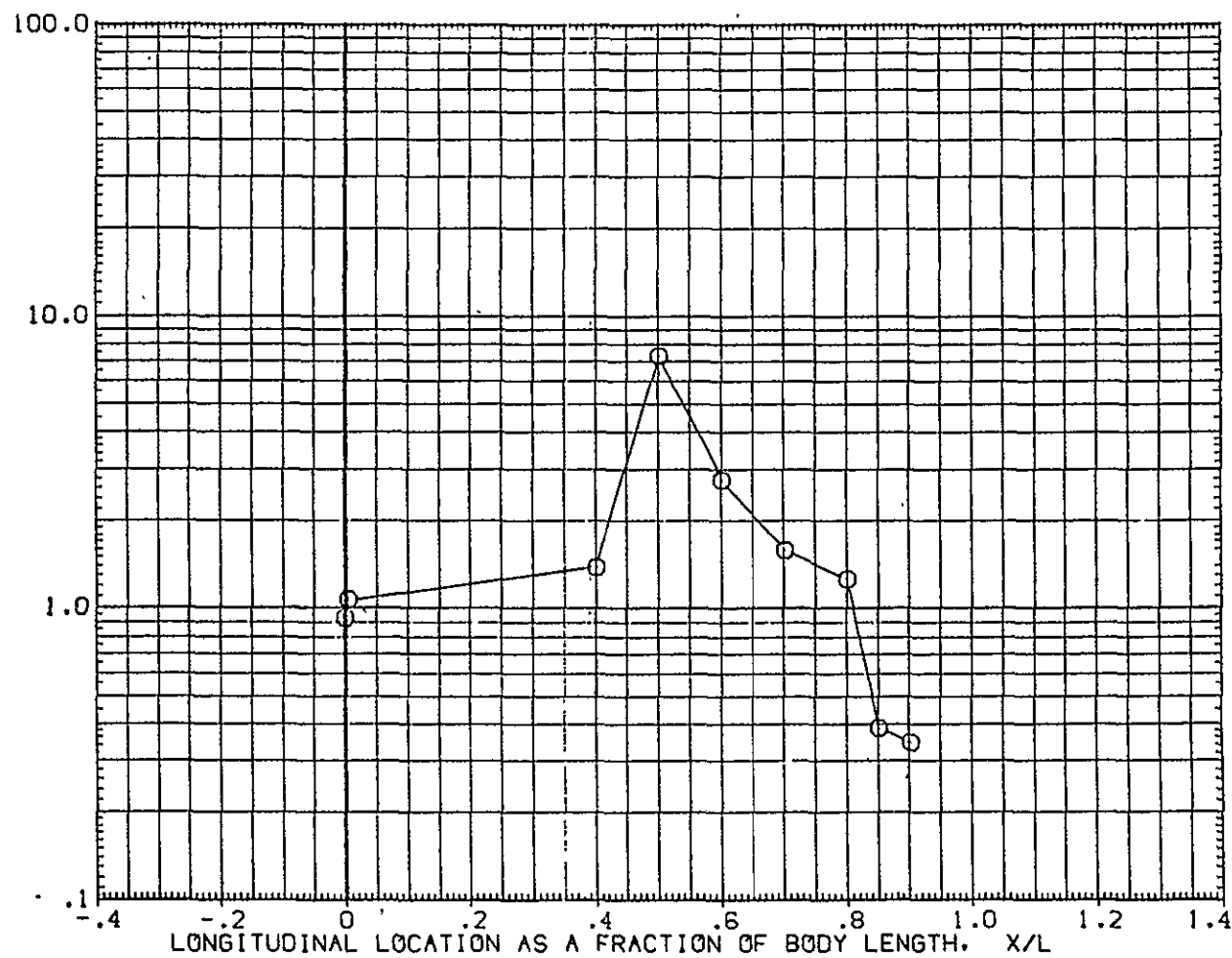


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER RN/L_1 ALPHA = 0

0H12 + IH21 MODEL 37 0T(05)/T(01) TANK (IUGT05)

SYMBOL HAW/HT PHI MACH
 O .900 241.000 19.180

PARAMETRIC VALUES
 ALPHA .000 BETA .000

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU

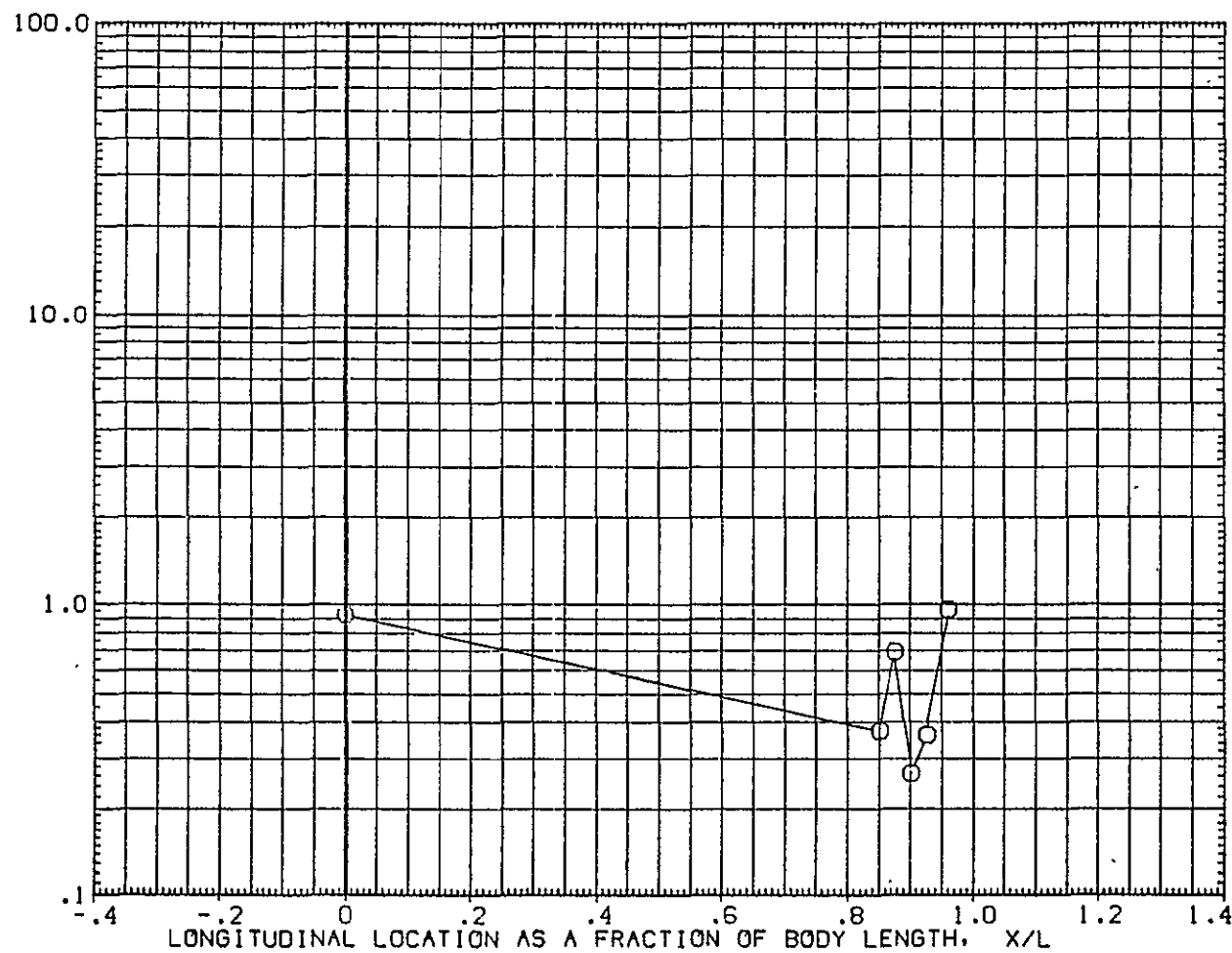


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

0412 + 1H21 MODEL 37 0T(05)/T(01) TANK (IUGT05)

| | | | | | | |
|--------|--------|---------|--------|-------|-------------------|------|
| SYMBOL | HAW/HT | PHI | MACH | ALPHA | PARAMETRIC VALUES | BETA |
| ○ | .900 | 247.000 | 19.180 | .000 | .000 | .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU

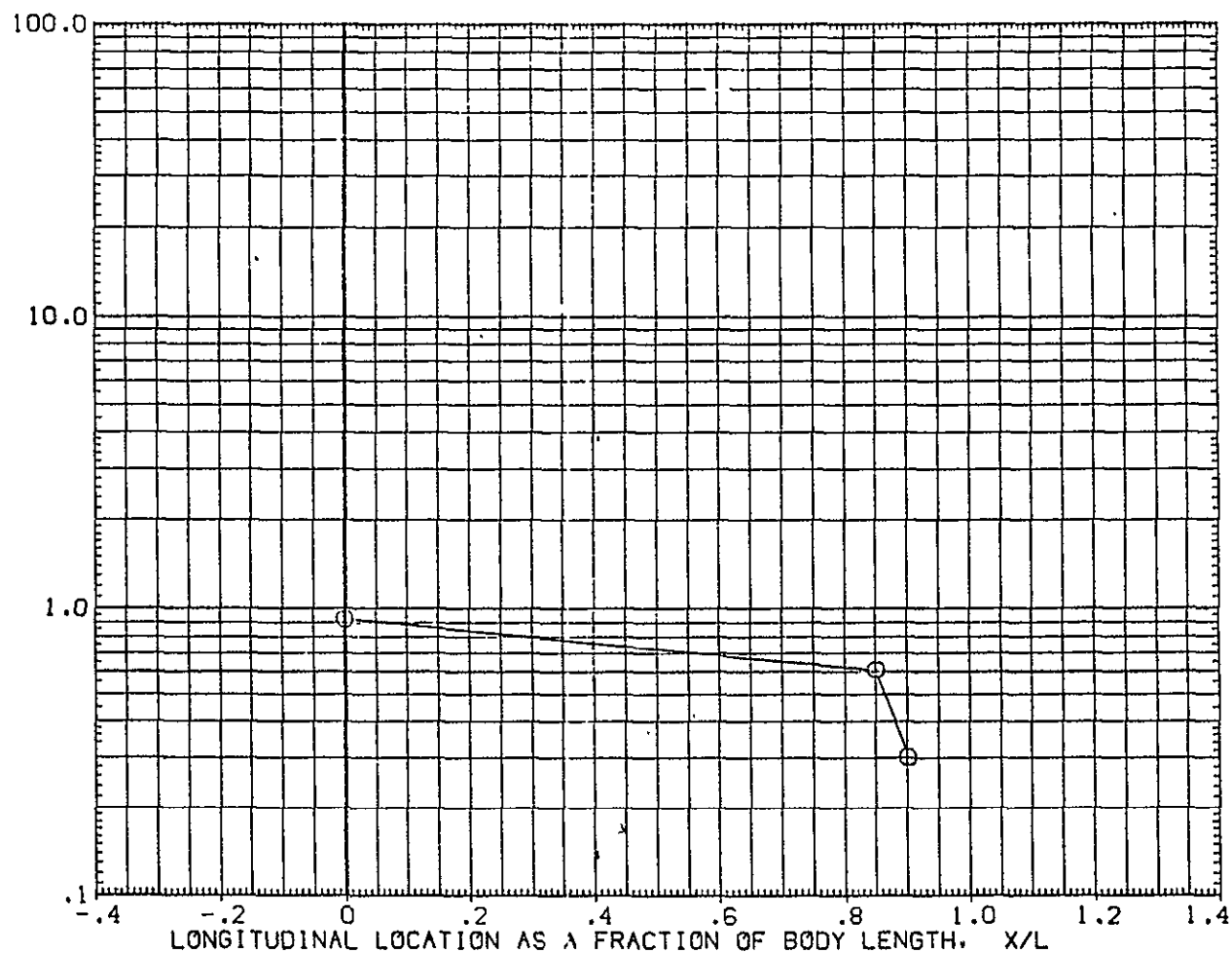


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

0H12 + IH21 MODEL 37 OT(05)/T(01) TANK (IUGT05)

| | | | | |
|--------|--------|---------|--------|----------------------|
| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES |
| ○ | .900 | 270.000 | 19.180 | ALPHA .000 BETA .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU

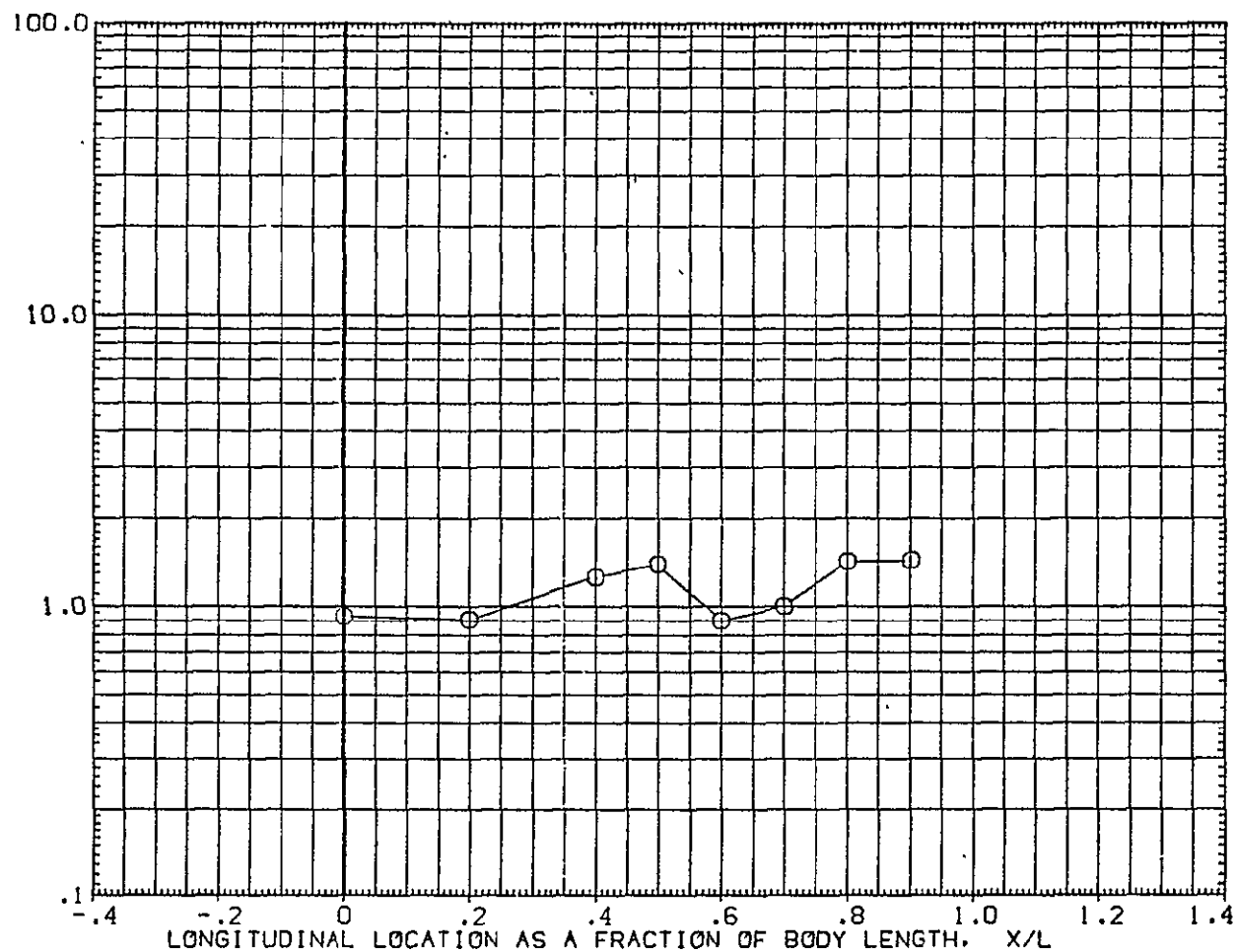


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$, ALPHA = 0

0H12 + IH21 MODEL 37 0T(05)/T(01) TANK (IUGT05)

| | | | | | | |
|--------|--------|---------|--------|-------------------|------|-----------|
| SYMBOL | HAW/HT | P41 | MACH | PARAMETRIC VALUES | | |
| ○ | .900 | 315.000 | 19.180 | ALPHA | .000 | BETA .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU

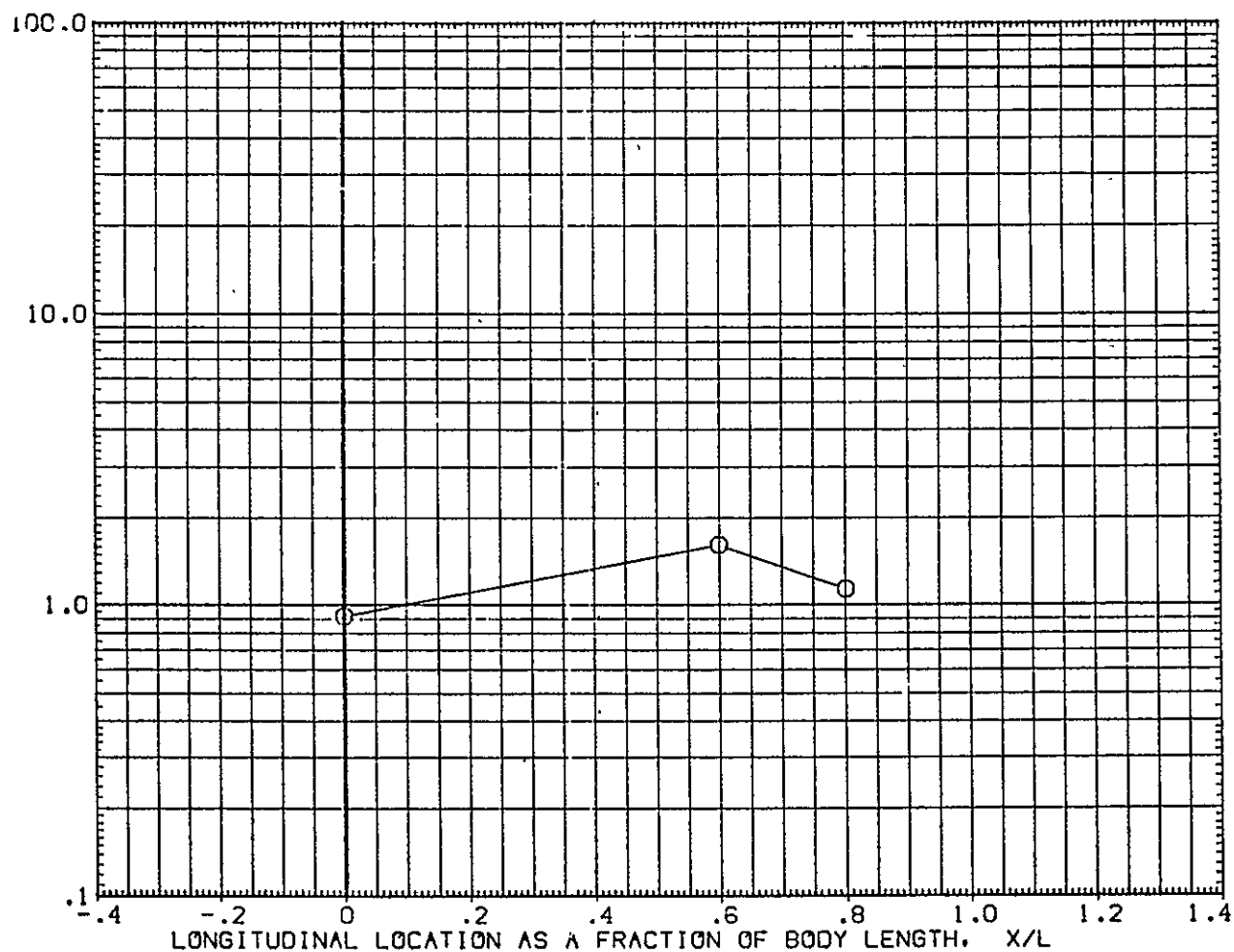


FIG. 4 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L1$ ALPHA = 0

OH12/IH21 (CAL HST 173-100) 37 T TANK (RUGT02)

| | | | | | | |
|--------|--------|------|--------|-------------------|-------|------|
| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
| ○ | .850 | .000 | 19.170 | ALPHA | 5.000 | BETA |
| □ | .900 | | | | | .000 |
| ◇ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, h/h_{REF}

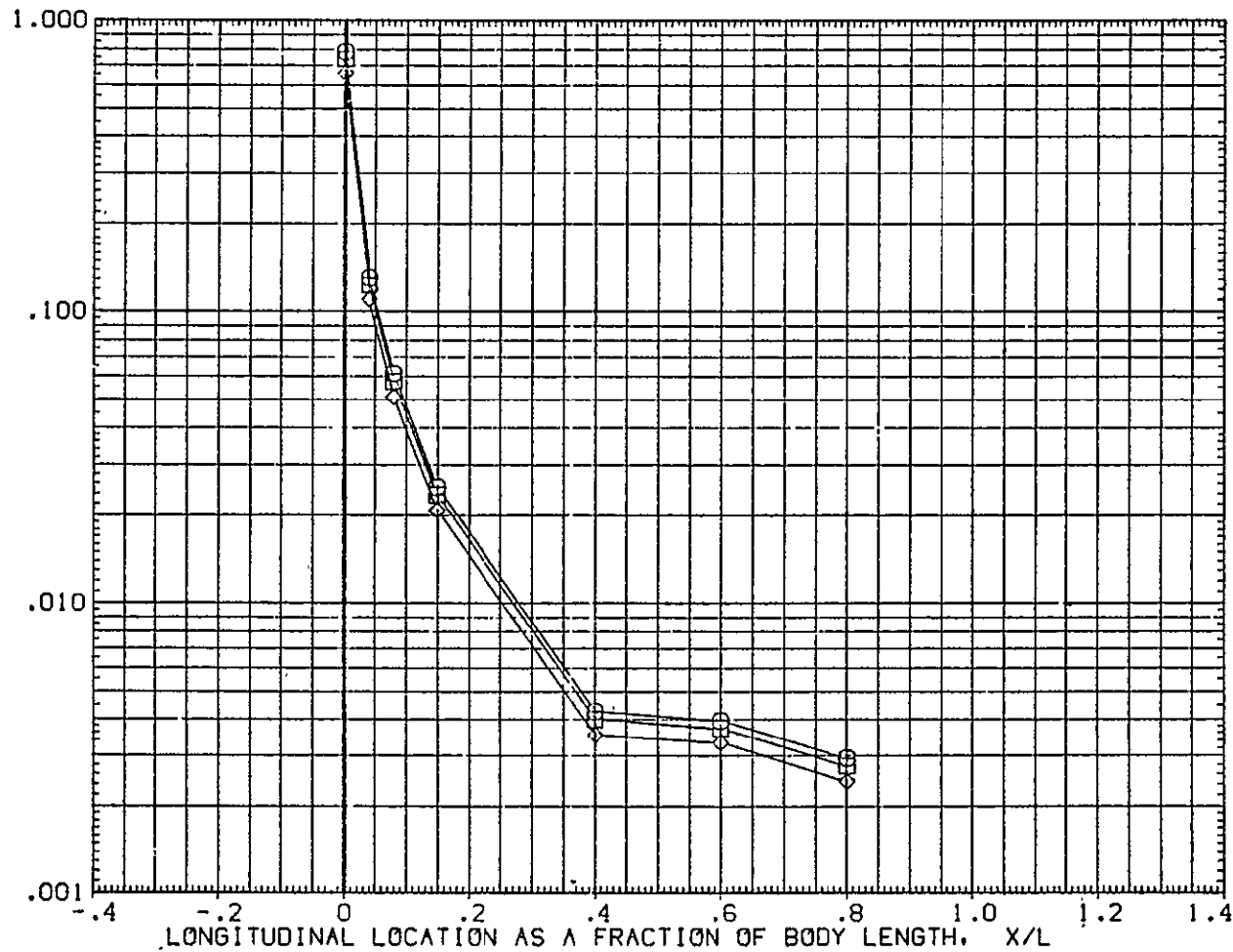


FIG. 5 EFFECT OF RECOVERY FACTOR ON THE EXTERNAL TANK HEAT TRANSFER, ALPHA = 5

REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR.

| | | | | | | | |
|--------|---|--------|---------|--------|-------------------|-------|------|
| SYMBOL | ○ | HAU/HT | PHI | MACH | PARAMETRIC VALUES | | |
| | □ | .850 | 180.000 | 19.170 | ALPHA | 5.000 | BETA |
| | ◇ | .900 | | | | | .000 |
| | | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, h/h_{REF}

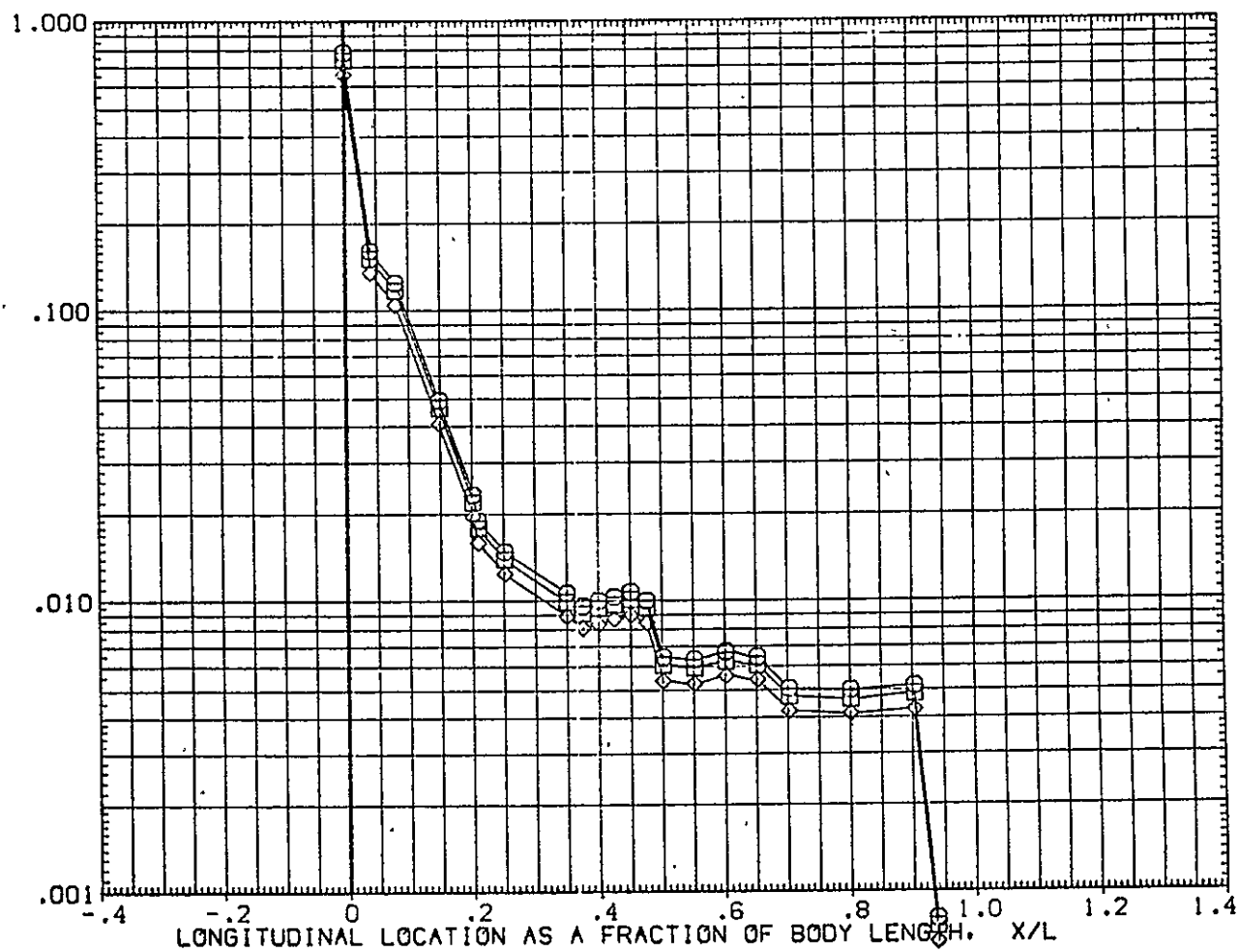


FIG. 5 EFFECT OF RECOVERY FACTOR ON THE EXTERNAL TANK HEAT TRANSFER ALPHA = 5

0H12/IH21 (CAL HST 173-100) 37 T

TANK

(RUGT02)

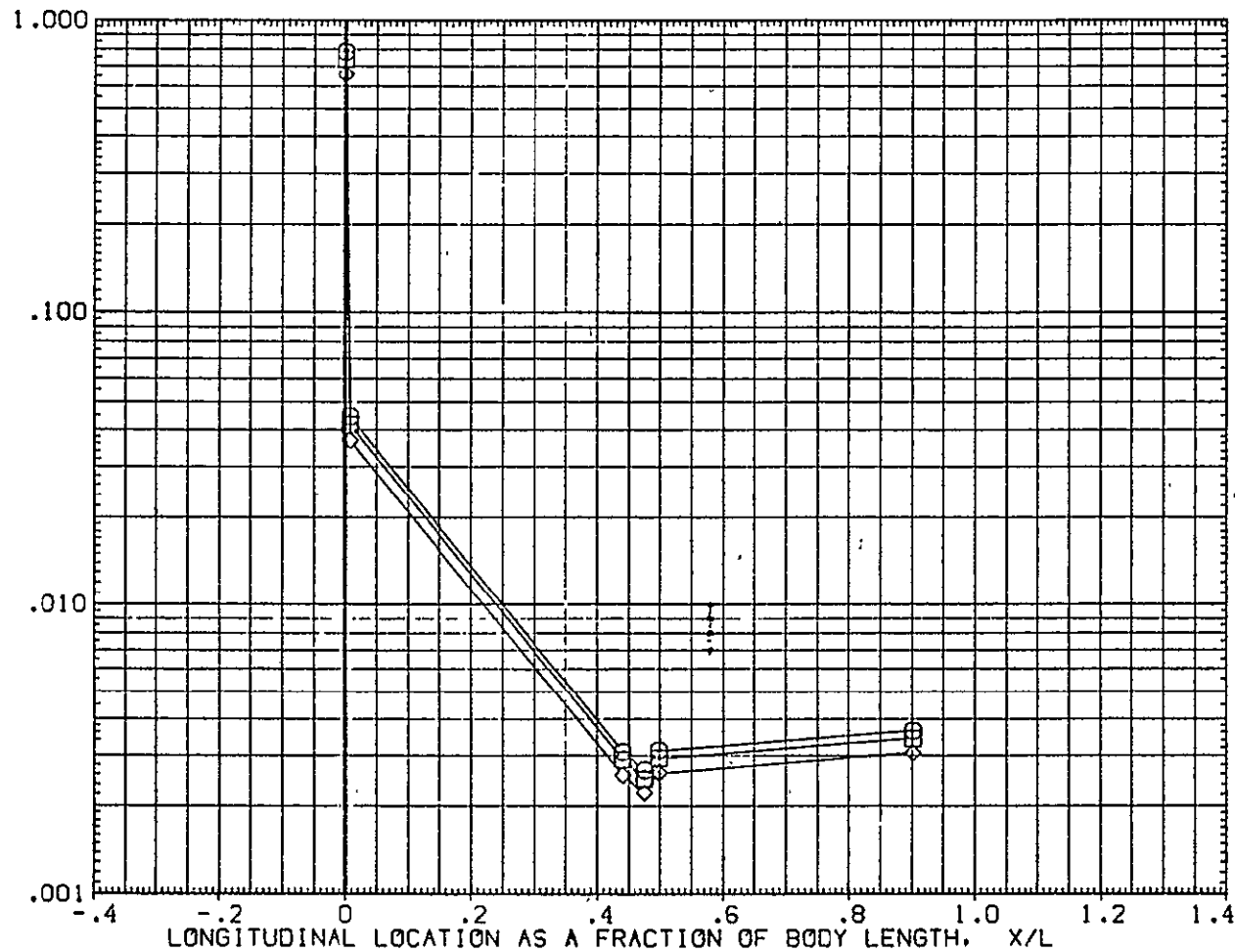
SYMBOL
○
□
◇HAW/HT
.850
.900
1.000PHI
199.000MACH
19.170PARAMETRIC VALUES
ALPHA 5.000 BETA .000RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF} 

FIG. 5 EFFECT OF RECOVERY FACTOR ON THE EXTERNAL TANK HEAT TRANSFER ALPHA = 5

OH12/IH21 (CAL HST 173-100) 37 T TANK (RUGT02)

| | | | | | | |
|--------|--------|---------|--------|-------------------|-------|-----------|
| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
| ◇ | .850 | 221.000 | 19.170 | ALPHA | 5.000 | BETA .000 |
| □ | .900 | | | | | |
| ○ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

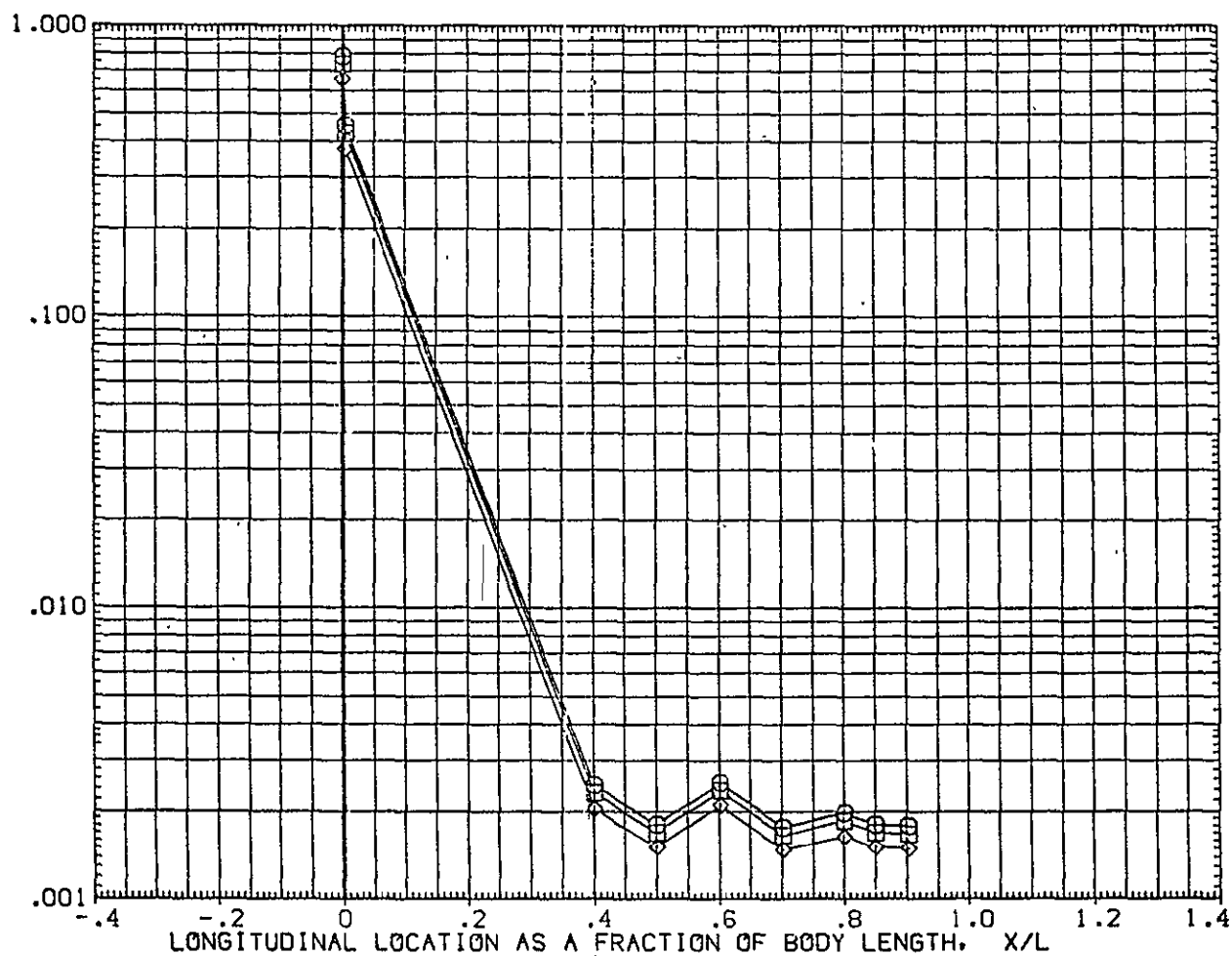


FIG. 5 EFFECT OF RECOVERY FACTOR ON THE EXTERNAL TANK HEAT TRANSFER ALPHA = 5

OH12/IH21 (CAL HST 173-100) 37 T

TANK (RUGT02)

| SYMBOL | HAW/HT | PHI | MACH | ALPHA | PARAMETRIC VALUES | BETA | |
|--------|--------|---------|--------|-------|-------------------|------|------|
| ○ | .850 | 241.000 | 19.170 | 5.000 | | | .000 |
| □ | .900 | | | | | | |
| ◇ | 1.000 | | | | | | |

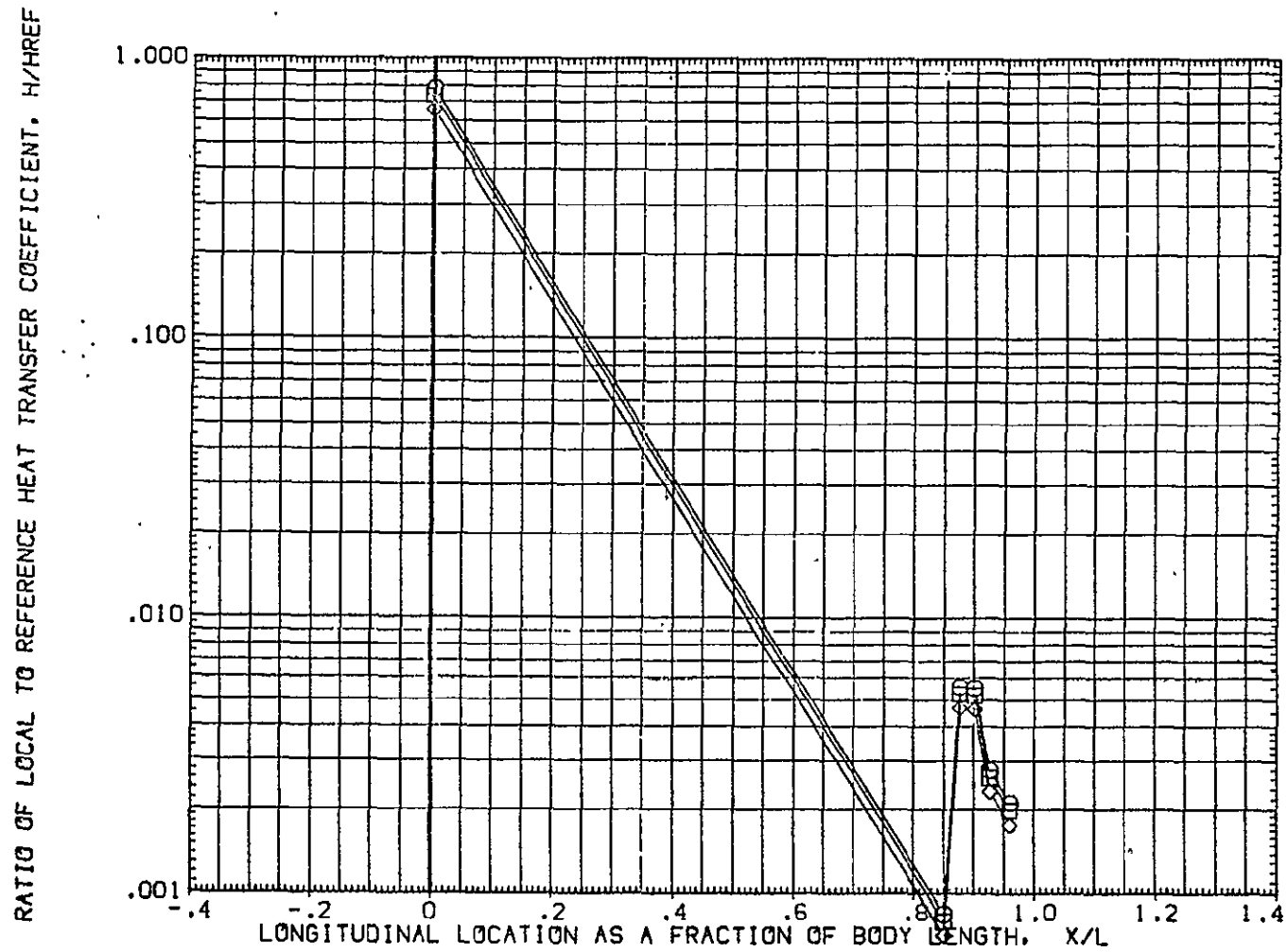


FIG. 5 EFFECT OF RECOVERY FACTOR ON THE EXTERNAL TANK HEAT TRANSFER ALPHA = 5

0H12/1H21 (CAL HST 173-100) 37 T TANK (RUST02)

| | | | | | | |
|--------|--------|---------|--------|-------------------|-------|-----------|
| SYMBOL | MAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
| □ | .850 | 247.000 | 19.170 | ALPHA | 5.000 | BETA .000 |
| ◇ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, h/h_{REF}

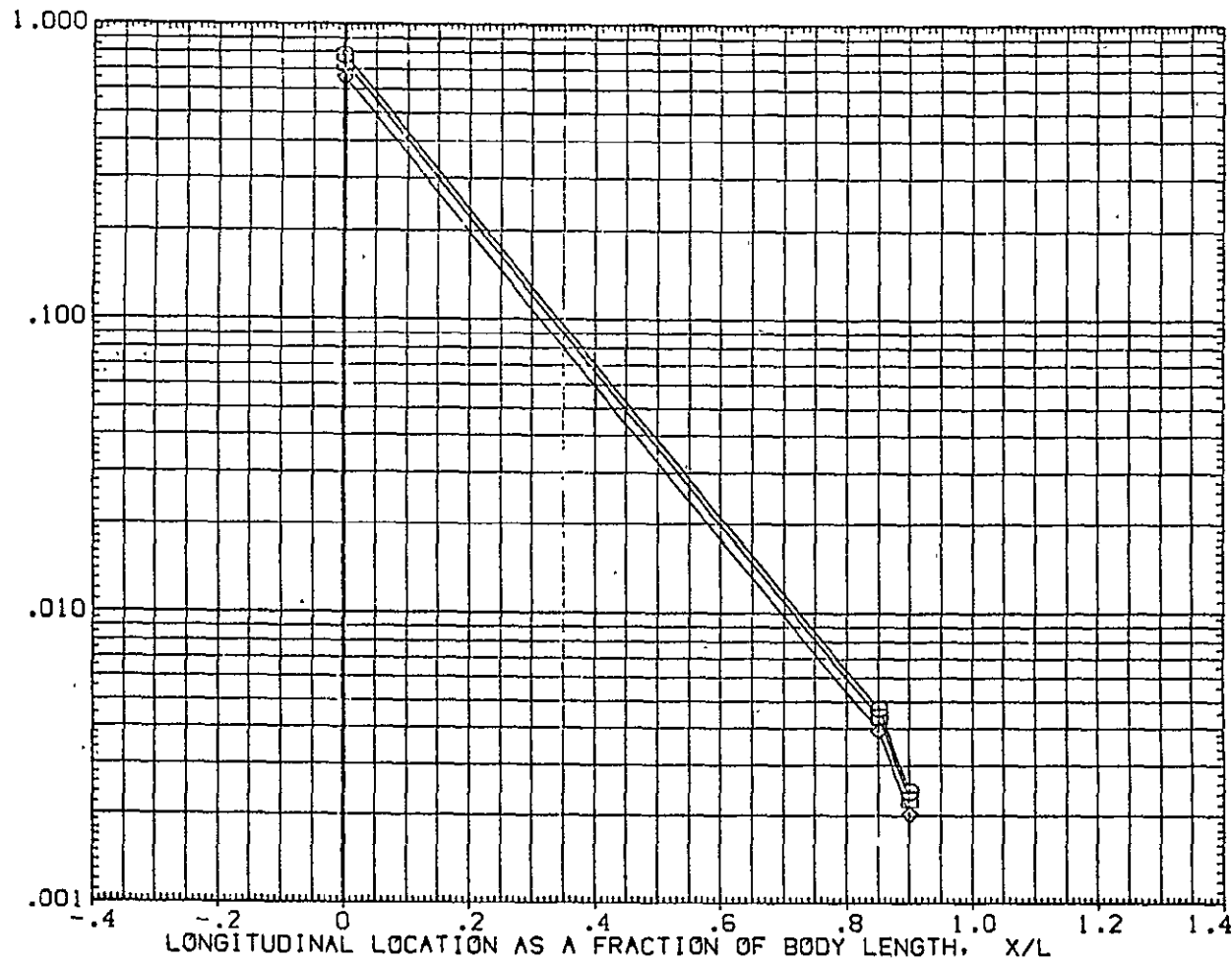


FIG. 5 EFFECT OF RECOVERY FACTOR ON THE EXTERNAL TANK HEAT TRANSFER ALPHA = 5

OH12/IH21 (CAL HST 173-100) 3' T TANK (RUGT02)

| SYMBOL | HAW/HT | PHI | MACH | ALPHA | PARAMETRIC VALUES | BETA | .000 |
|--------|--------|---------|--------|-------|-------------------|------|------|
| ○ | .850 | 270.000 | 19.170 | | | | |
| □ | .900 | | | | | | |
| ◇ | 1.000 | | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, h/h_{REF}

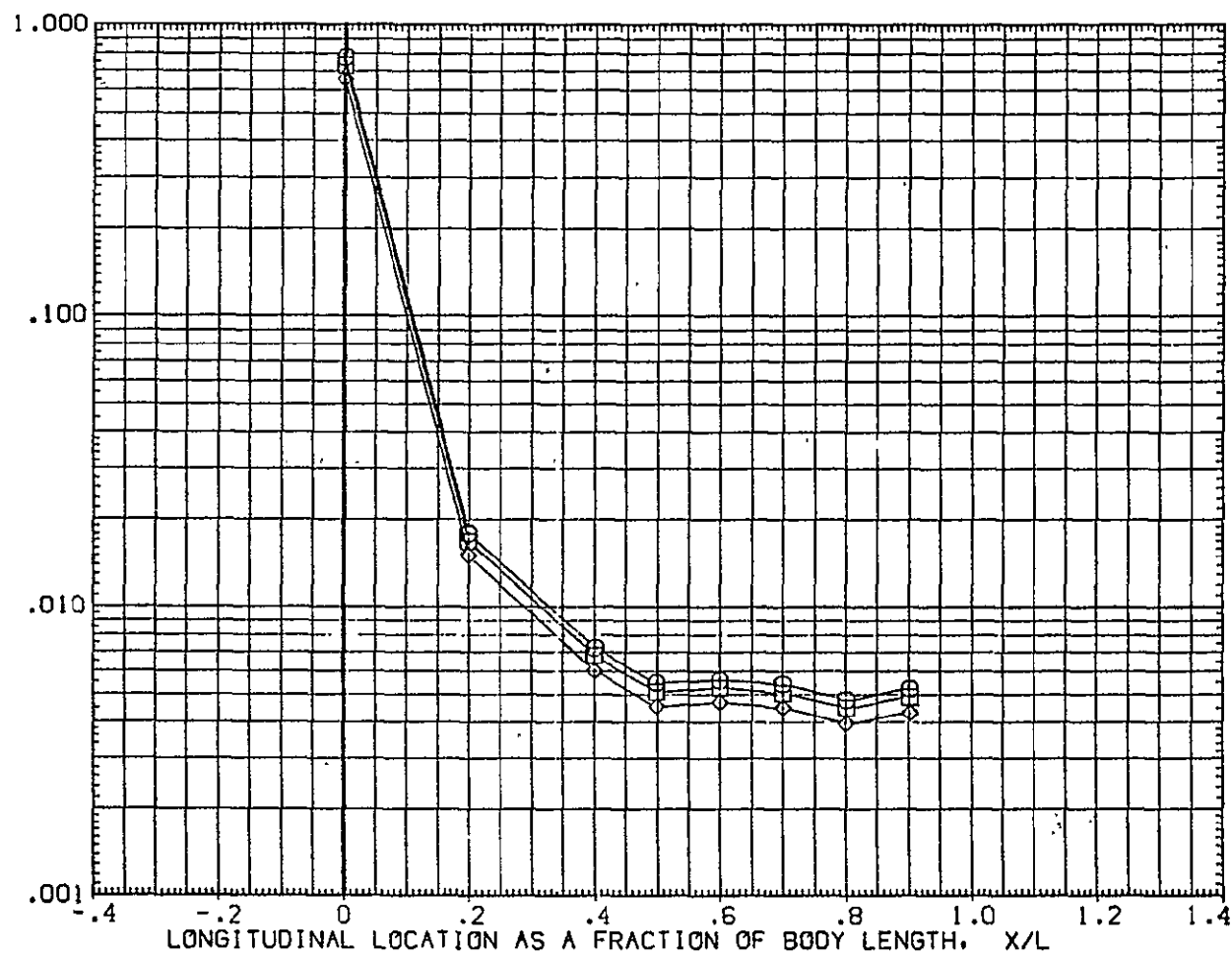


FIG. 5 EFFECT OF RECOVERY FACTOR ON THE EXTERNAL TANK HEAT TRANSFER ALPHA = 5

0H12/IH21 (CAL HST I73-100) 37 T TANK (RUGT02)

| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
|--------|--------|---------|--------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| □ | .850 | 315.000 | 19.170 | 5.000 | | .000 |
| ◇ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

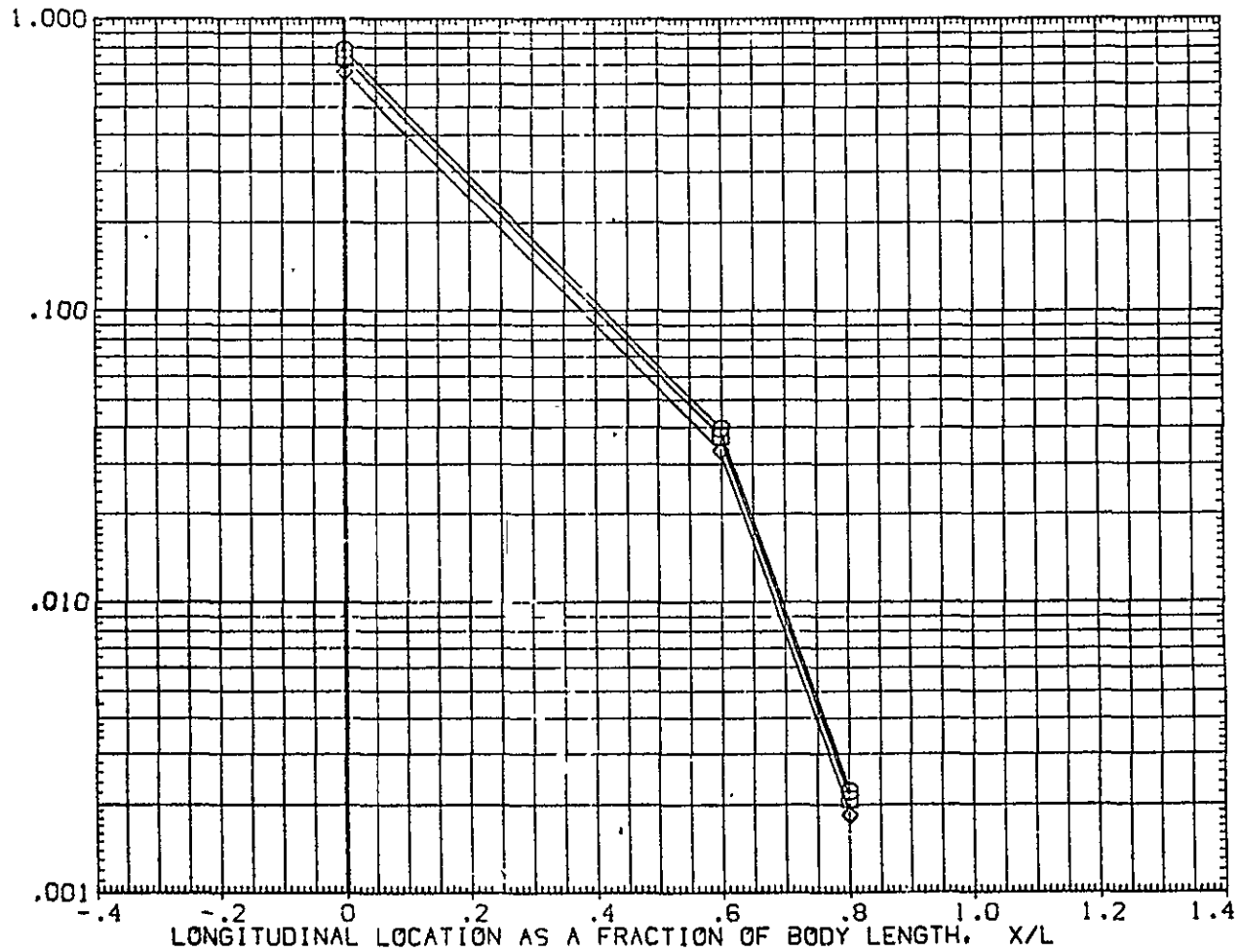


FIG. 5 EFFECT OF RECOVERY FACTOR ON THE EXTERNAL TANK HEAT TRANSFER ALPHA = 5

OH12/IH21 (CAL HST 173-100) 37 0 T TANK (RUGT06)

| | | | | | | | |
|--------|--------|------|--------|-------|-------------------|--|------|
| SYMBOL | HAW/HT | PHI | MACH | ALPHA | PARAMETRIC VALUES | | BETA |
| ◇ | .850 | .000 | 18.790 | 5.000 | | | .000 |
| □ | .900 | | | | | | |
| ◇ | 1.000 | | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

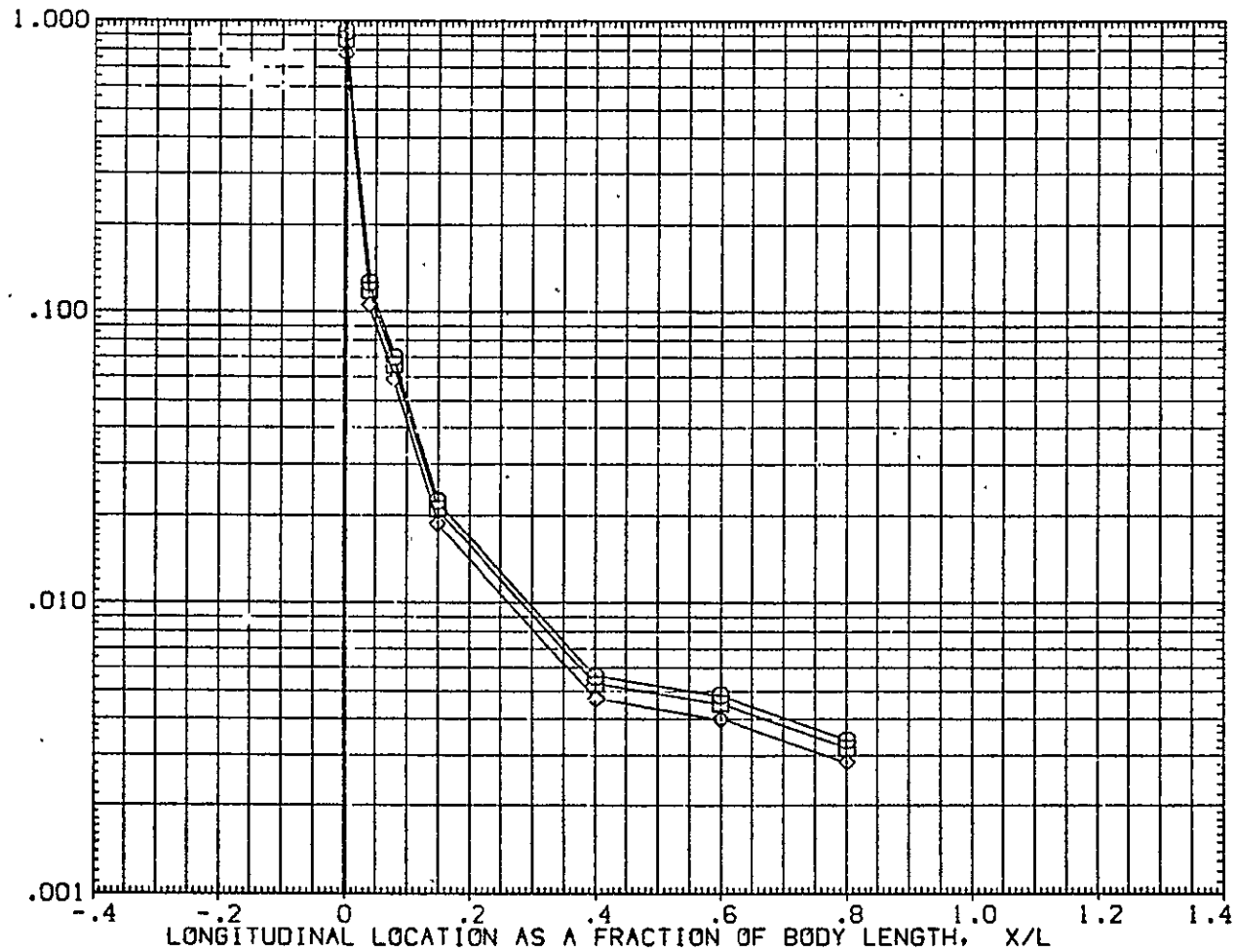


FIG. 5 EFFECT OF RECOVERY FACTOR ON THE EXTERNAL TANK HEAT TRANSFER ALPHA = 5

| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
|--------|--------|---------|--------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| ◇ | .850 | 180.000 | 18.790 | 5.000 | | .000 |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

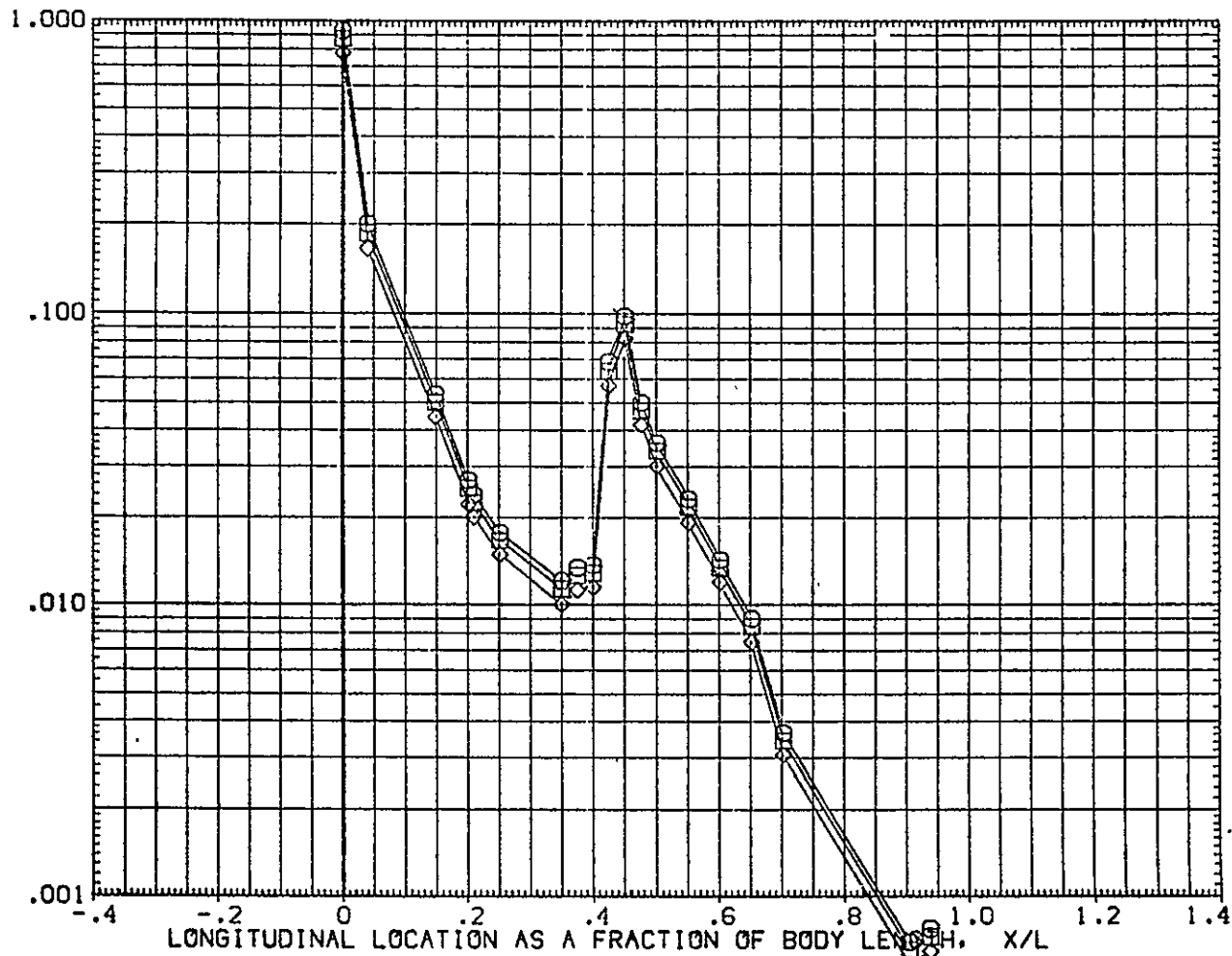
RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF} 

FIG. 5 EFFECT OF RECOVERY FACTOR ON THE EXTERNAL TANK HEAT TRANSFER ALPHA = 5

0H12/IH21 (CAL HST 173-100) 37 0 T TANK (RUGT06)

| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
|--------|--------|---------|--------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| ○ | .850 | 199.000 | 18.790 | 5.000 | | .000 |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

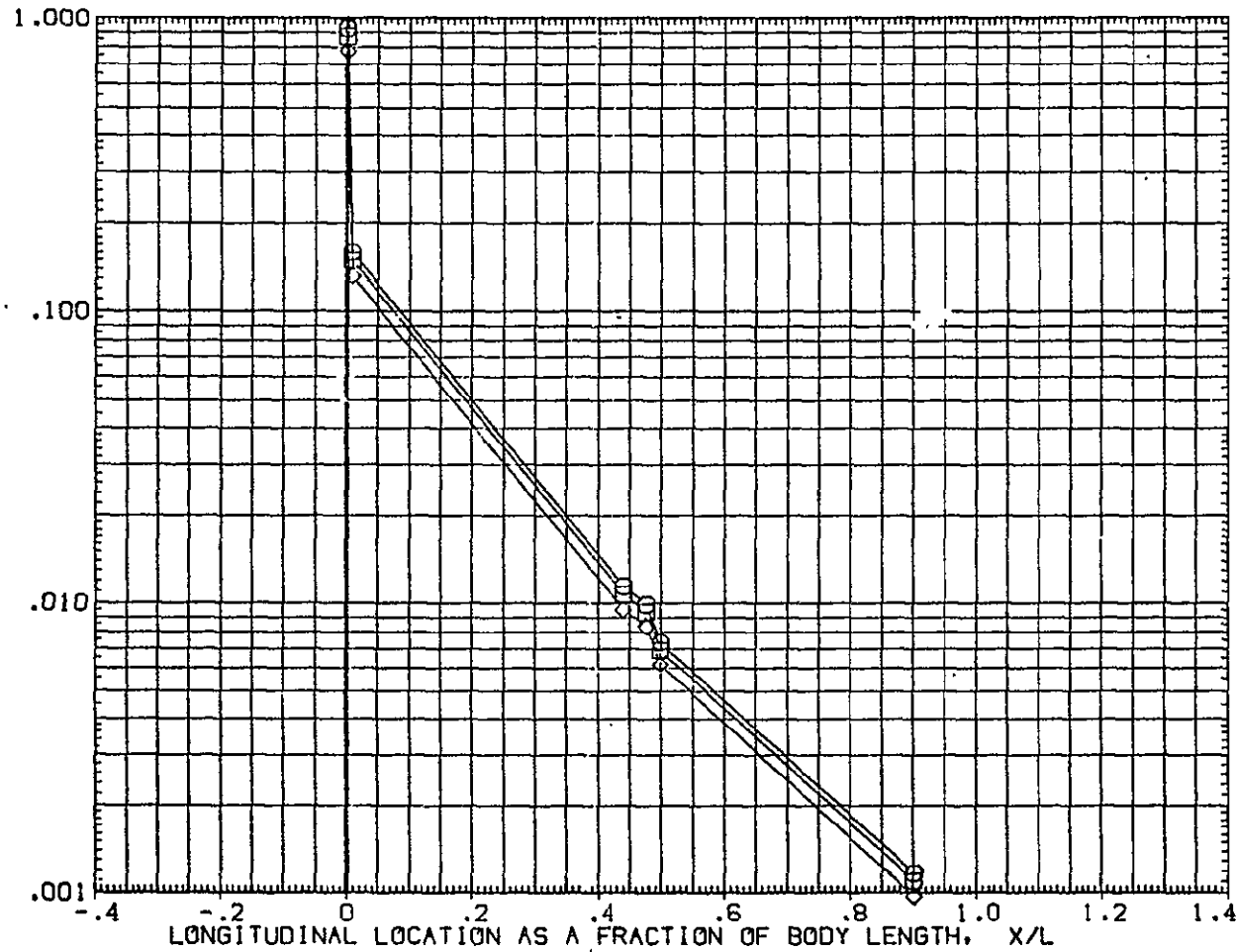


FIG. 5 EFFECT OF RECOVERY FACTOR ON THE EXTERNAL TANK HEAT TRANSFER $\alpha = 5$

OH12/IH21 (CAL HST 173-100) 37 0 T TANK (RUGT06)

| SYMBOL | HAM/HT | PHI | MACH | PARAMETRIC VALUES | | |
|--------|--------|---------|--------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| ◇ | .850 | 221.000 | 18.790 | 5.000 | | .000 |
| □ | .900 | | | | | |
| ○ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

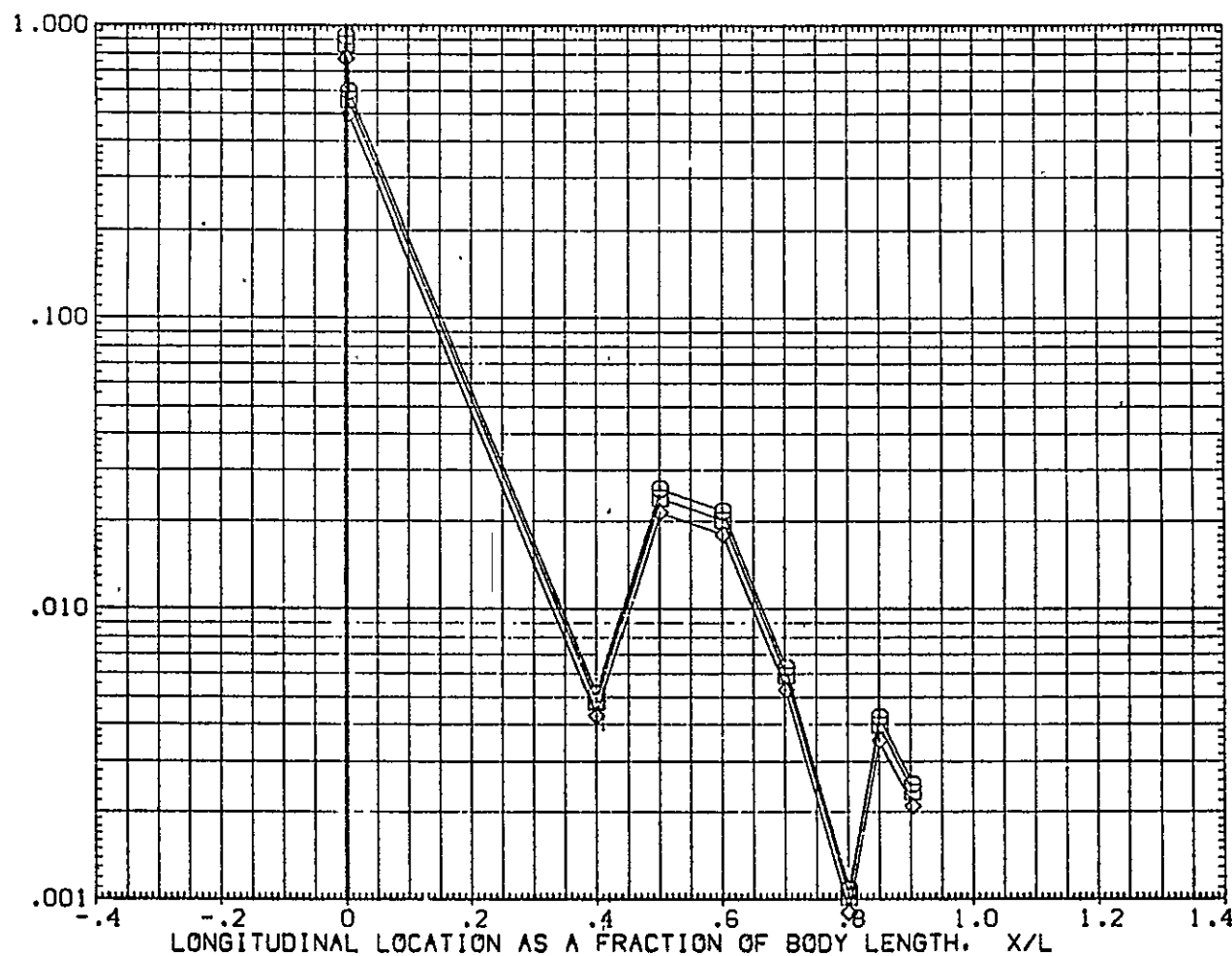


FIG. 5 EFFECT OF RECOVERY FACTOR ON THE EXTERNAL TANK HEAT TRANSFER ALPHA = 5

GH12/IH21 (CAL HST 173-100) 37 0 T TANK (RUGT06)

| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
|--------|--------|---------|--------|-------------------|-------|-----------|
| □ | .850 | 241.000 | 18.790 | ALPHA | 5.000 | BETA .000 |
| ◇ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

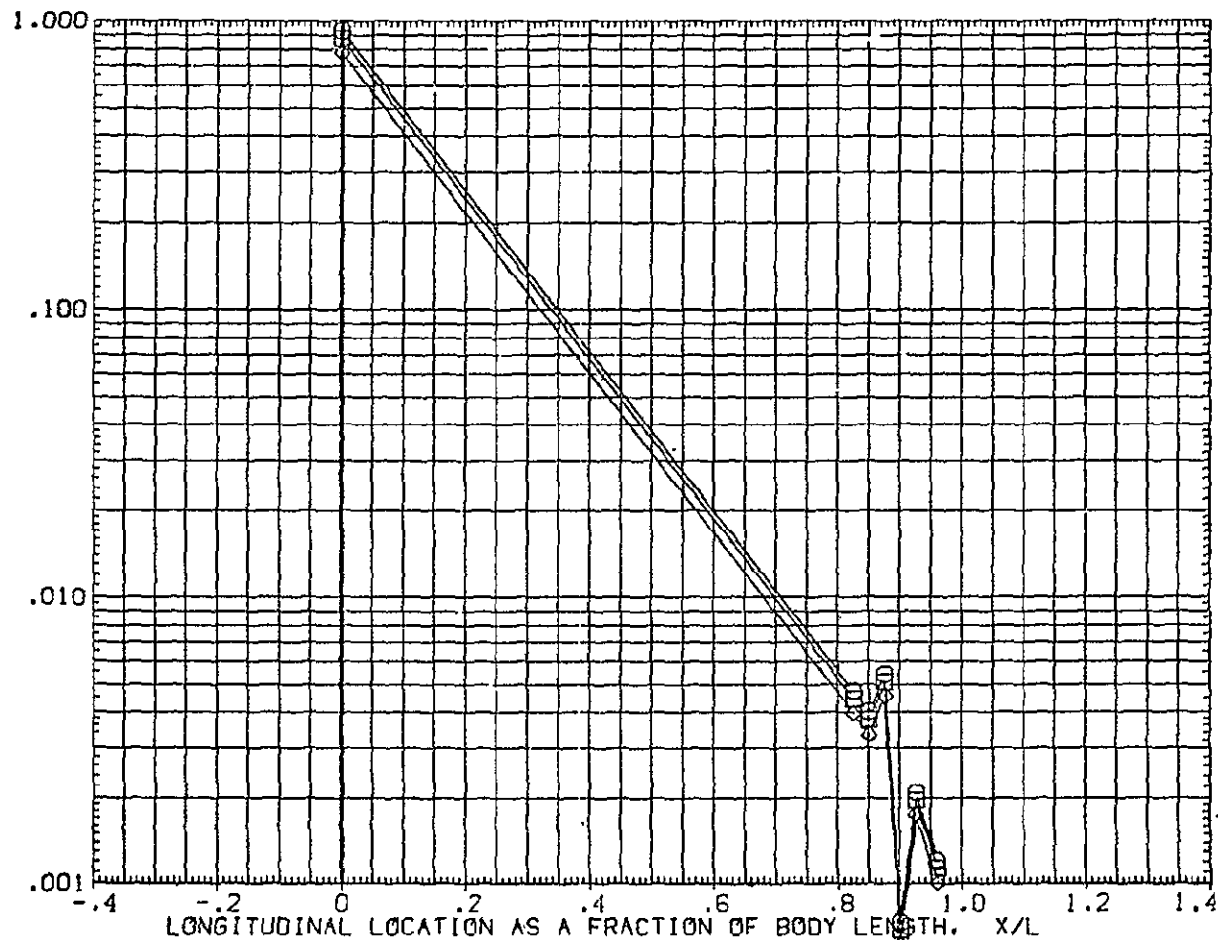


FIG. 5 EFFECT OF RECOVERY FACTOR ON THE EXTERNAL TANK HEAT TRANSFER ALPHA = 5

| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
|--------|--------|---------|--------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| ◇ | .850 | 247.000 | 18.790 | 5.000 | | .000 |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

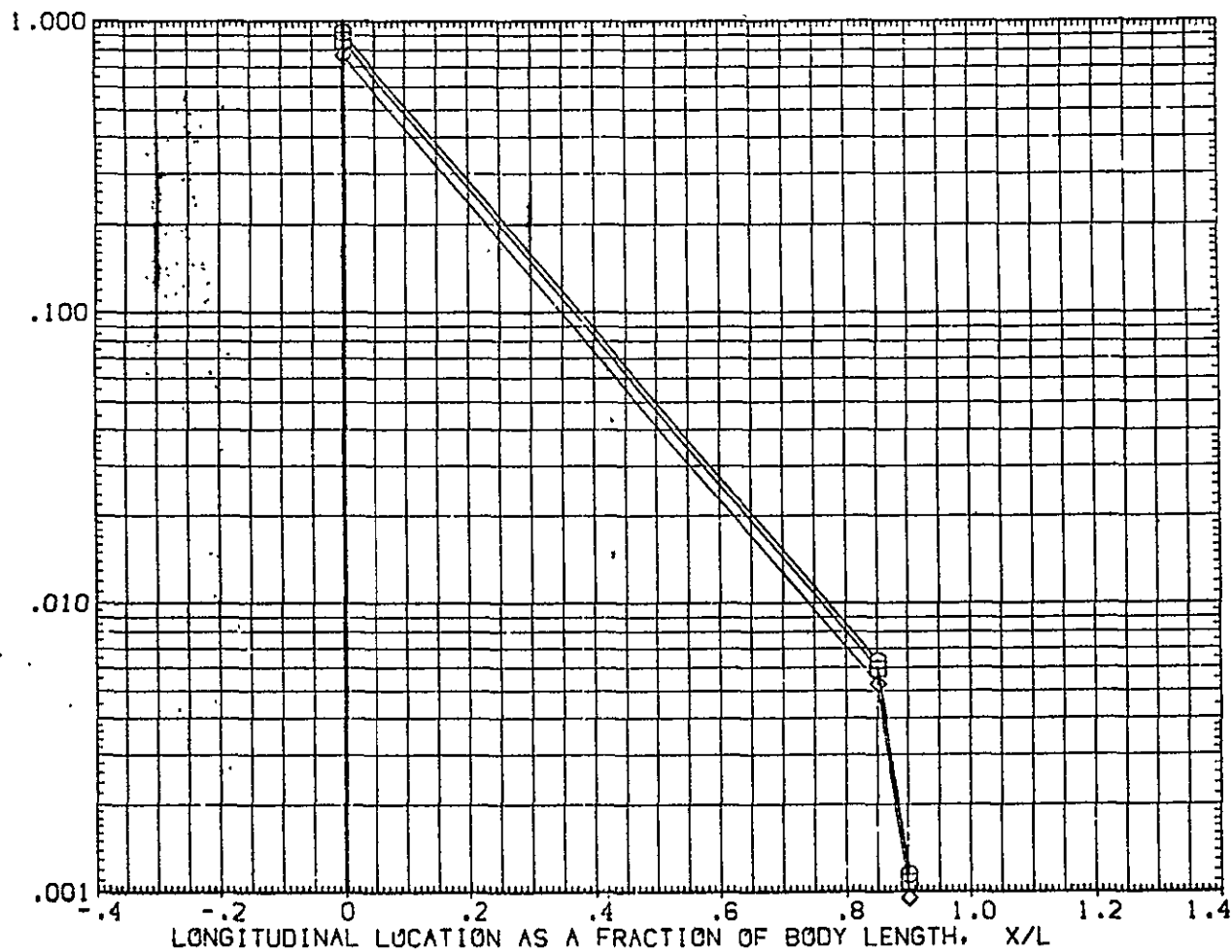
RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF} 

FIG. 5 EFFECT OF RECOVERY FACTOR ON THE EXTERNAL TANK HEAT TRANSFER ALPHA = 5

OH12/IH21 (CAL HST 173-100) 37 0 T TANK (RUGT06)

| | | | | | | |
|--------|--------|---------|--------|-------------------|-------|------|
| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
| ○ | .850 | 270.000 | 18.790 | ALPHA | 5.000 | BETA |
| □ | .900 | | | | | .000 |
| ◇ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, h/h_{REF}

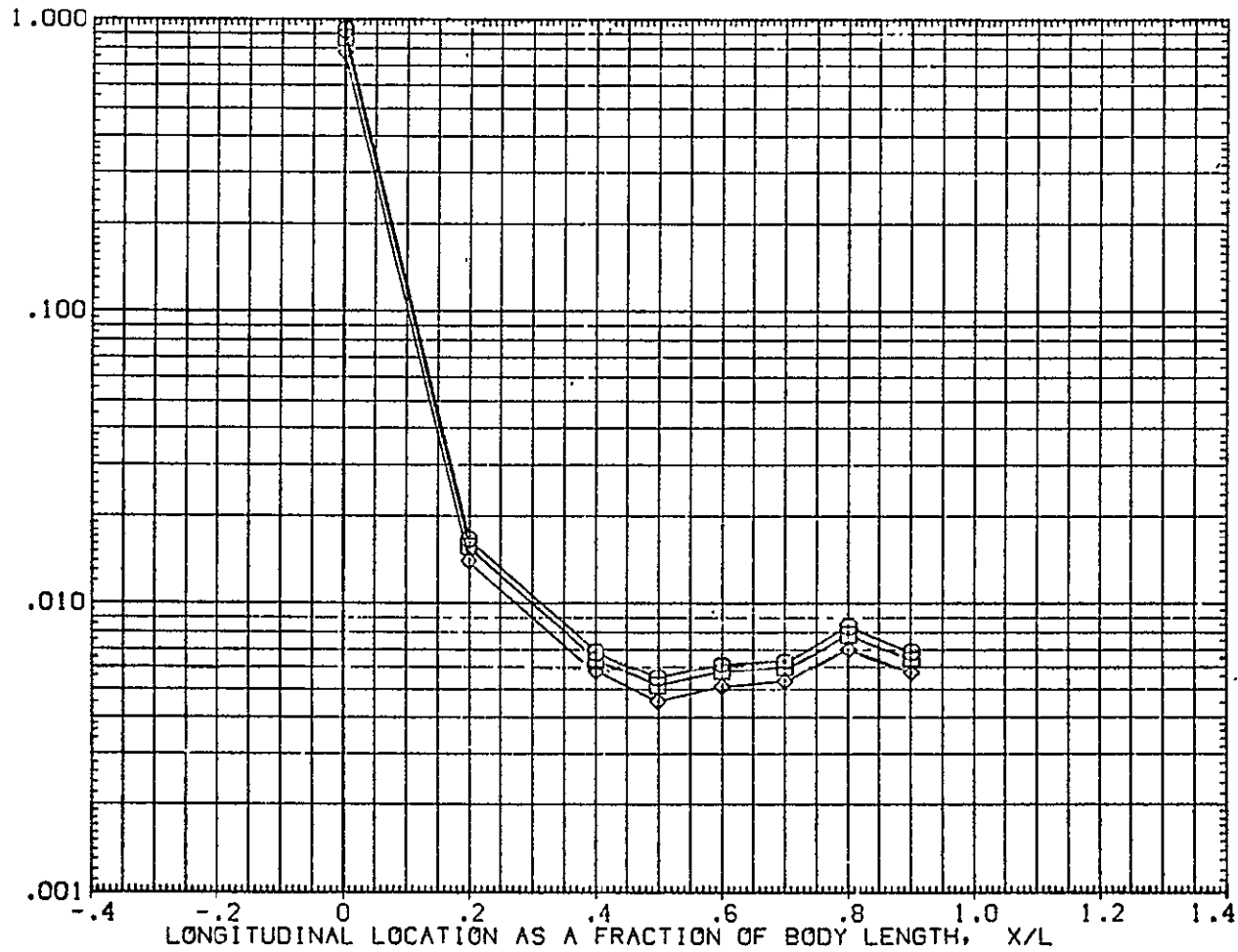


FIG. 5 EFFECT OF RECOVERY FACTOR ON THE EXTERNAL TANK HEAT TRANSFER ALPHA = 5

OH12/IH21 (CAL HST 173-100) 37 G F TANK (RUGT06)

| | | | | | | | |
|--------|--------|---------|--------|-------|-------------------|------|--|
| SYMBOL | HAW/HT | PHI | MACH | ALPHA | PARAMETRIC VALUES | BETA | |
| ○ | .850 | 315.000 | 18.790 | 5.000 | | .000 | |
| □ | .900 | | | | | | |
| ◇ | 1.000 | | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, h/h_{REF}

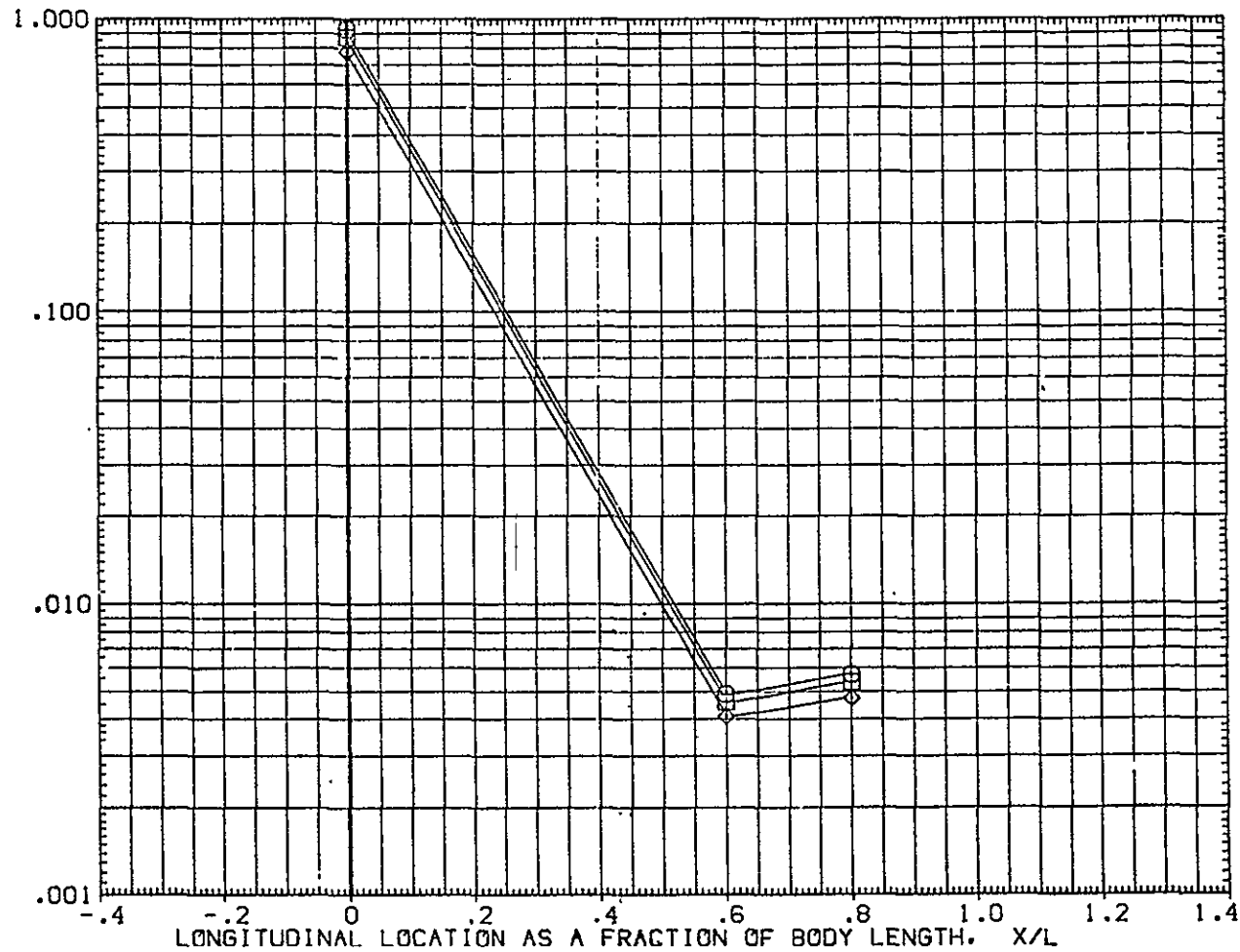


FIG. 5 EFFECT OF RECOVERY FACTOR ON THE EXTERNAL TANK HEAT TRANSFER ALPHA = 5

OH12 + IH21 MODEL 37 OT(06)/T(02) TANK (IUGT06)

| | | | | |
|--------|--------|------|--------|-----------------------|
| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES |
| O | .900 | .000 | 18.980 | ALPHA 5.000 BETA .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, H_i/H_u

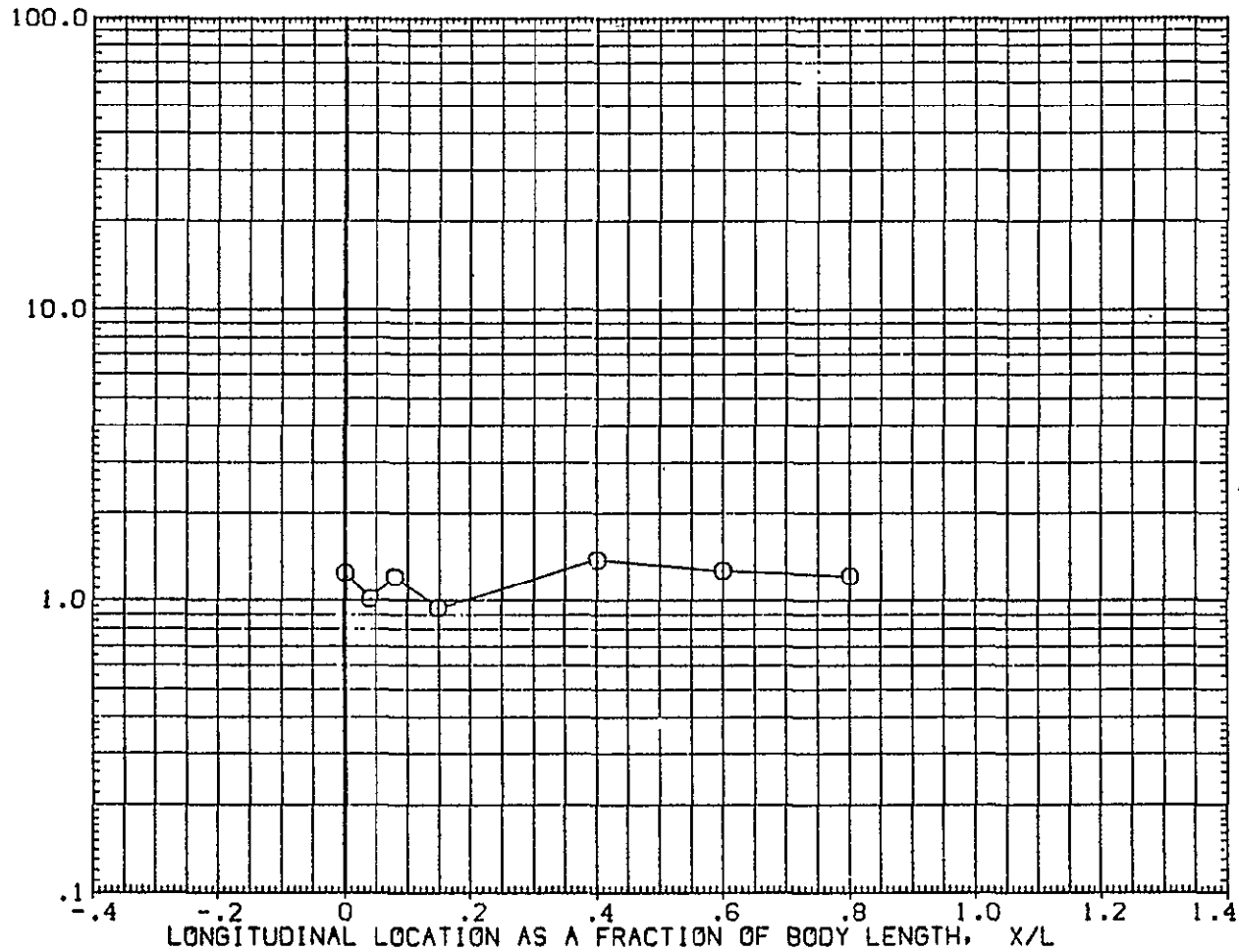


FIG. 5 EFFECT OF RECOVERY FACTOR ON THE EXTERNAL TANK HEAT TRANSFER ALPHA = 5

0H12 + 1H21 MODEL 37 0T(06)/T(02) TANK (1UGT06)

| | | | | | | |
|--------|--------|---------|--------|-------------------|-------|-----------|
| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
| O | .900 | 180.000 | 18.980 | ALPHA | 5.000 | BETA .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT. HI/HU

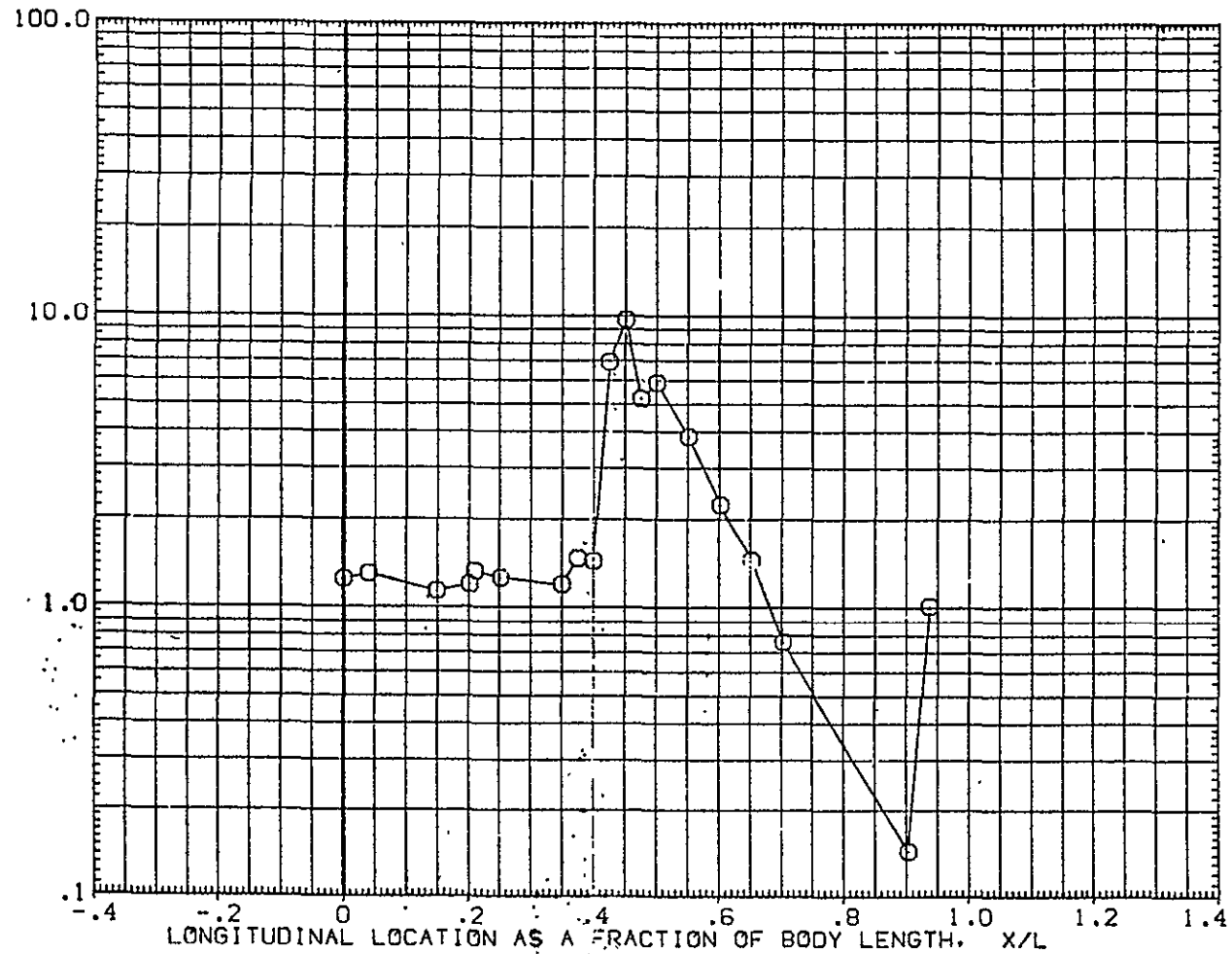


FIG. 5 EFFECT OF RECOVERY FACTOR ON THE EXTERNAL TANK HEAT TRANSFER ALPHA = 5

OH12 + 1H21 MODEL 37 OT(06)/T(02) TANK (IUGT06)

| | | | | | | |
|--------|--------|---------|--------|-------|-------------------|------|
| SYMBOL | HAW/HT | PHI | MACH | ALPHA | PARAMETRIC VALUES | |
| O | .900 | 199.000 | 18.980 | 5.000 | BETA | .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, H_i/H_u

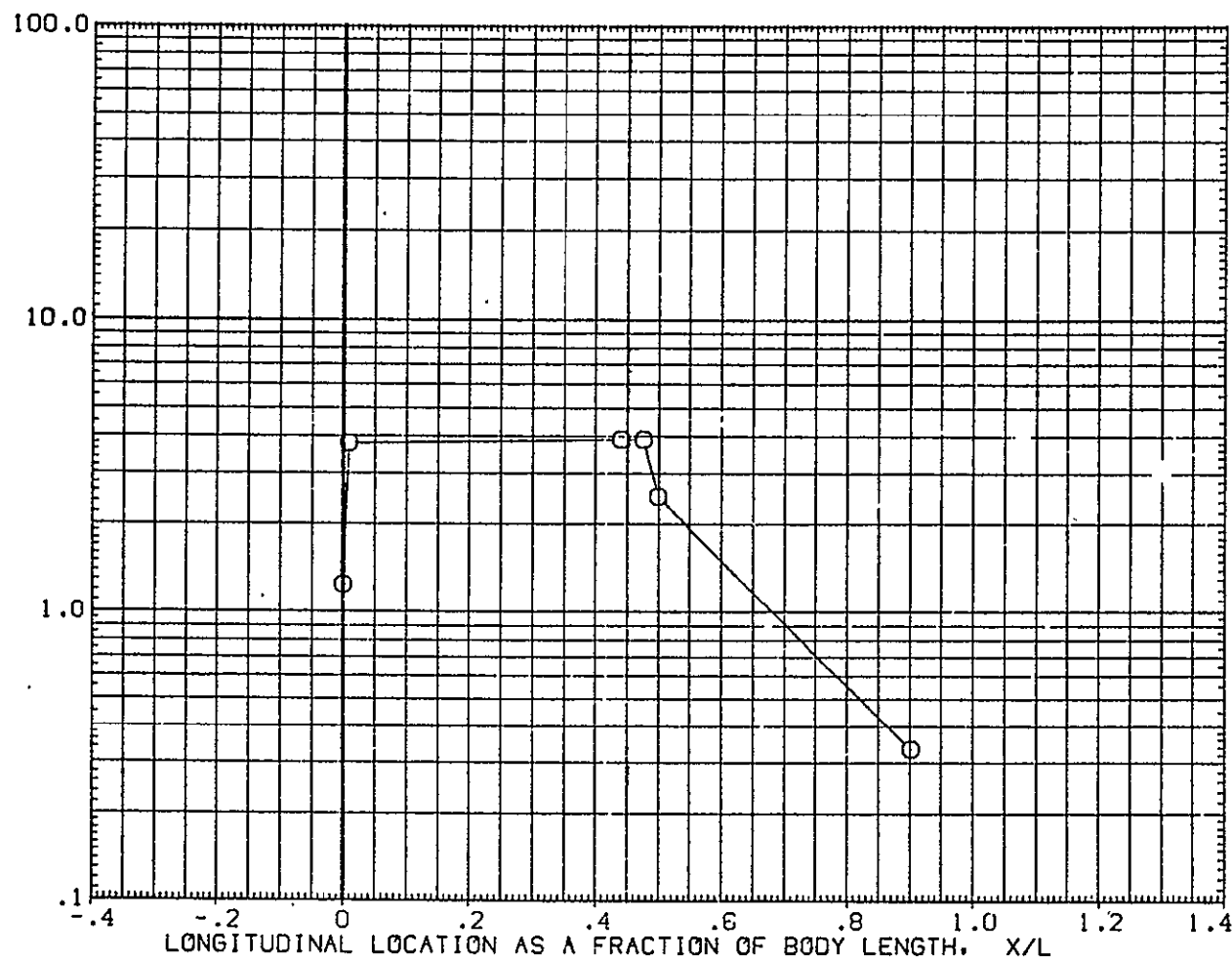


FIG. 5 EFFECT OF RECOVERY FACTOR ON THE EXTERNAL TANK HEAT TRANSFER ALPHA = 5

OH12 + IH21 MODEL 37 CT(06)/T(02) TANK

(IUGT06)

| SYMBOL | HAW/HT | PHI | MACH | ALPHA | PARAMETRIC VALUES | BETA | |
|--------|--------|---------|--------|-------|-------------------|------|------|
| ○ | .900 | 221.000 | 18.980 | | 5.000 | | .000 |

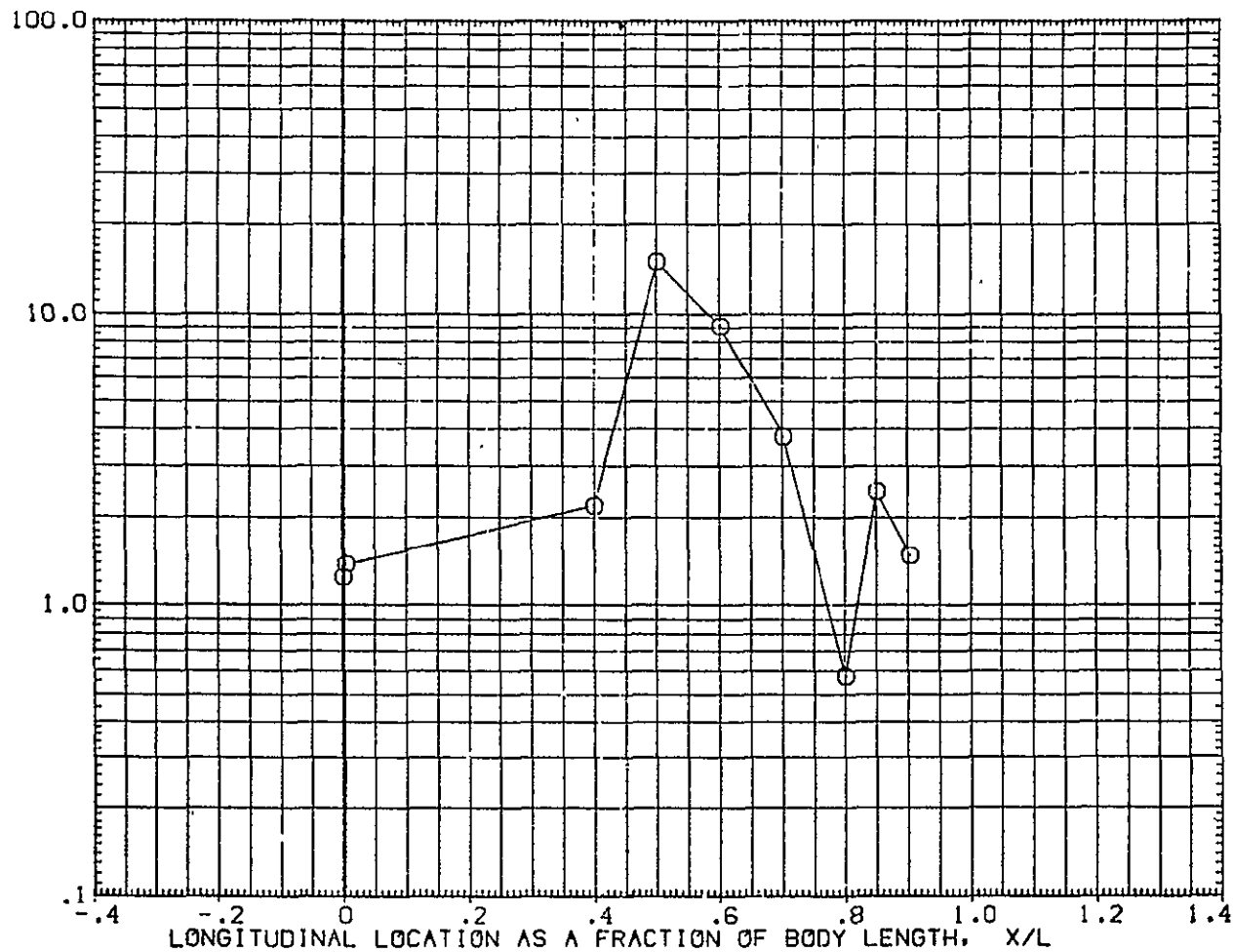
RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU 

FIG. 5 EFFECT OF RECOVERY FACTOR ON THE EXTERNAL TANK HEAT TRANSFER ALPHA = 5

0H12 + 1H21 MODEL 37 0T(06)/T(02) TANK (1UGT06)

SYMBOL
O
HAW/HT .900 PHI 241.000 MACH 18.980

PARAMETRIC VALUES
ALPHA 5.000 BETA .000

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU

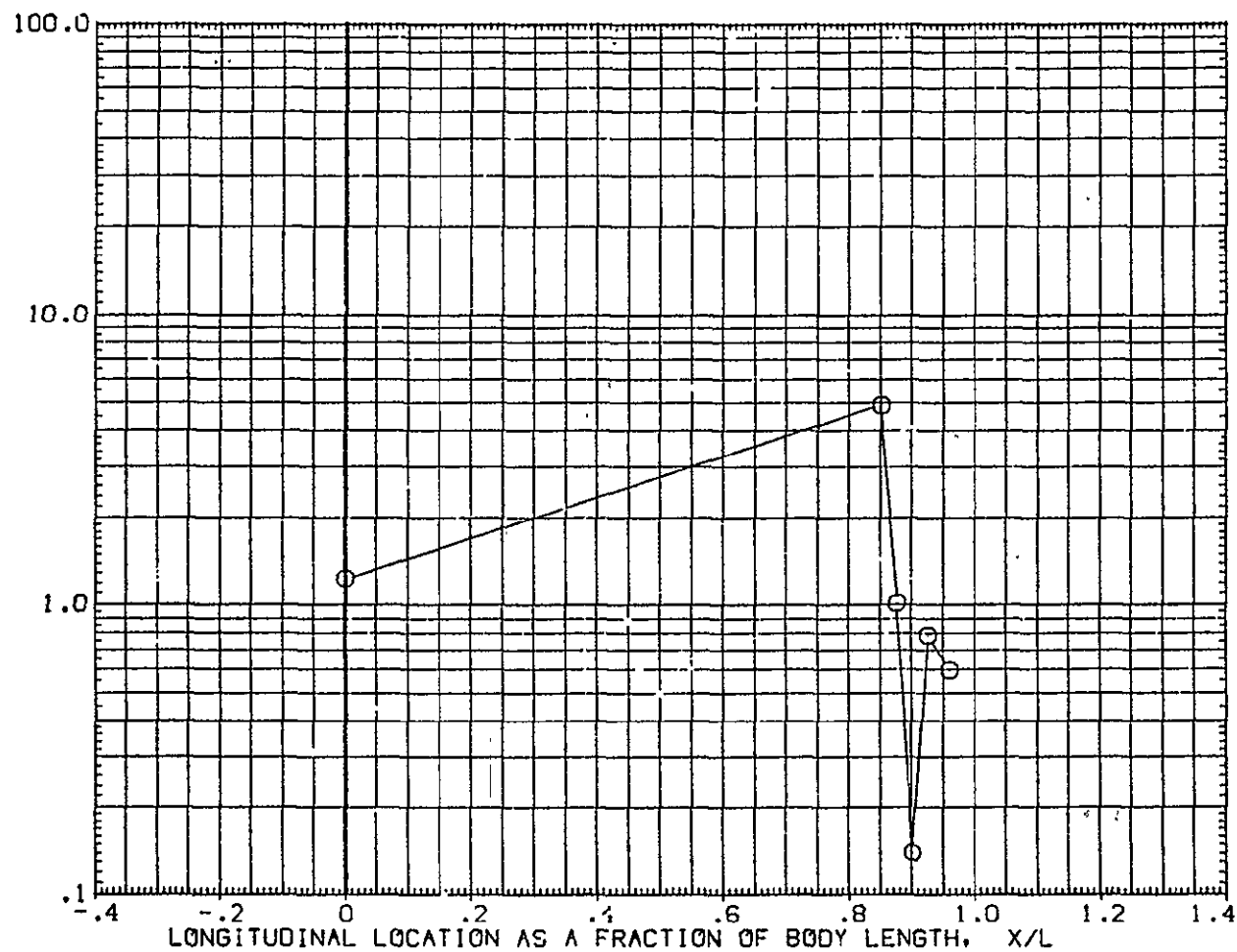


FIG. 5 EFFECT OF RECOVERY FACTOR ON THE EXTERNAL TANK HEAT TRANSFER ALPHA = 5

OH12 + IH21 MODEL 37 OT(06)/T(02) TANK (IUGT06)

| | | | | | | | |
|--------|--------|---------|--------|-------|-------------------|------|------|
| SYMBOL | HAW/HT | PHI | MACH | ALPHA | PARAMETRIC VALUES | BETA | .000 |
| O | .900 | 247.000 | 18.950 | | 5.000 | | |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU

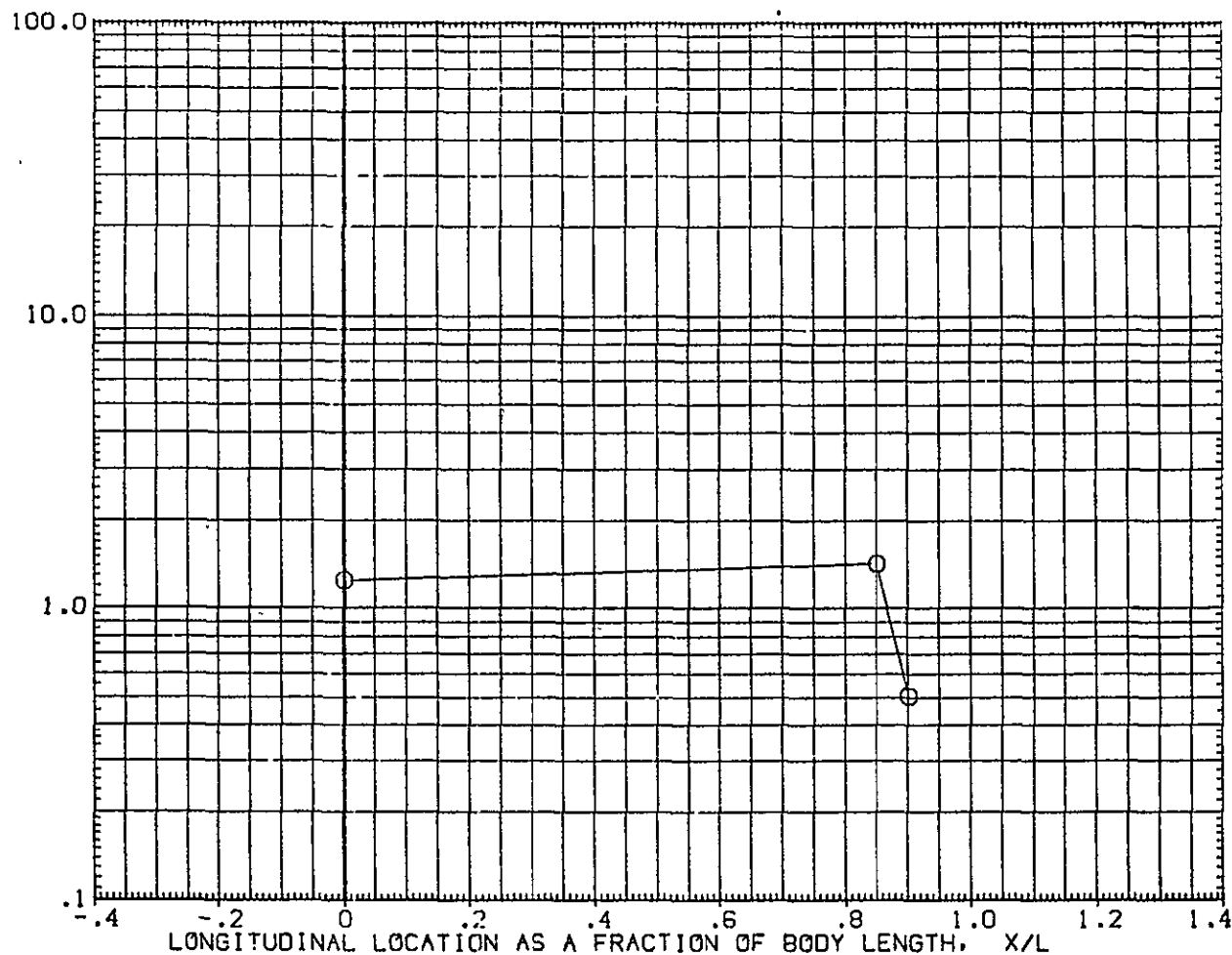


FIG. 5 EFFECT OF RECOVERY FACTOR ON THE EXTERNAL TANK HEAT TRANSFER ALPHA = 5

0412 + 1H21 MODEL 37 OT(06)/T(02) TANK (1UGT06)

| | | | | | | |
|--------|--------|---------|--------|-------------------|-------|-----------|
| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
| O | .900 | 270.000 | 18.980 | ALPHA | 5.000 | BETA .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU

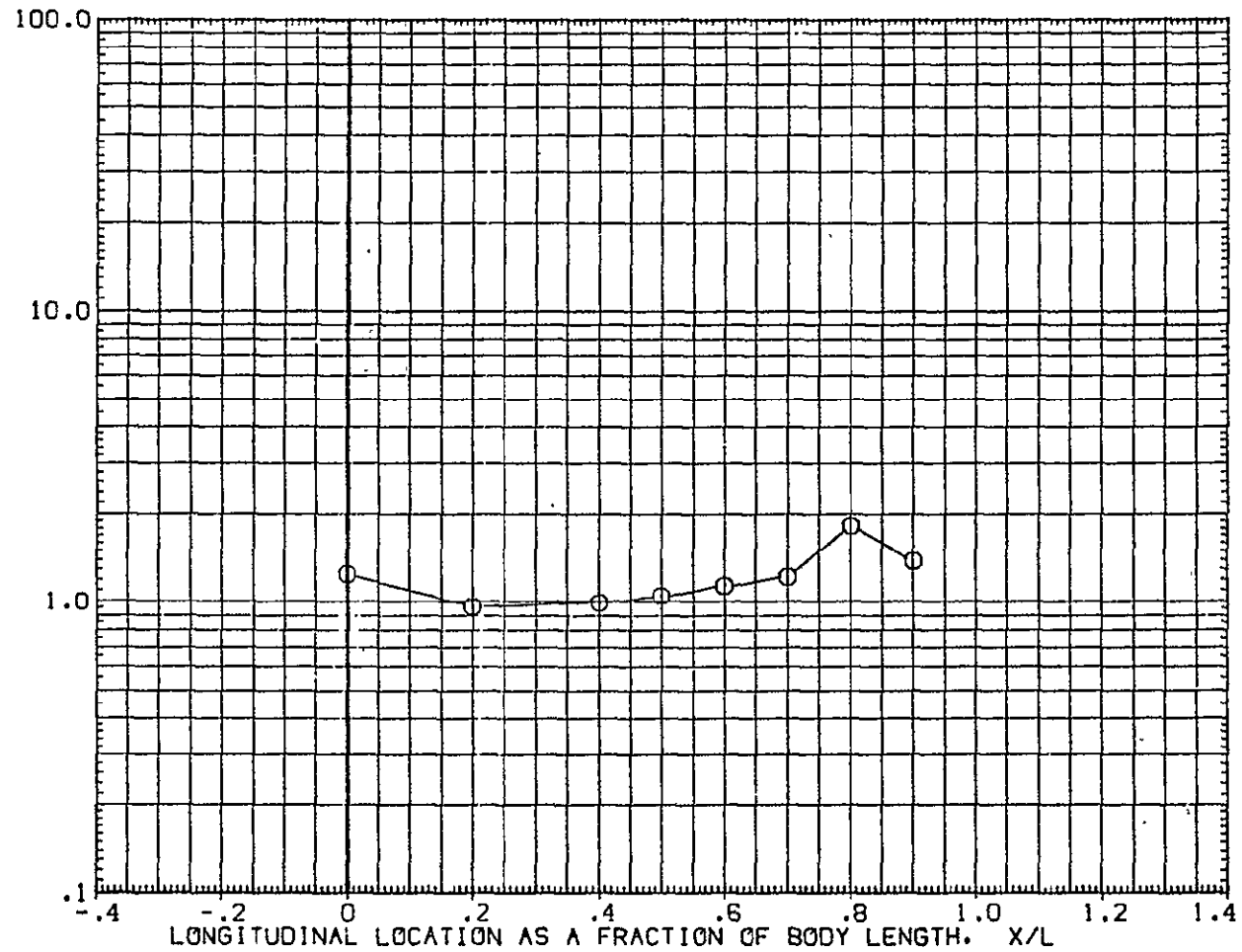


FIG. 5 EFFECT OF RECOVERY FACTOR ON THE EXTERNAL TANK HEAT TRANSFER ALPHA = 5

OH12 + IH21 MODEL 37 OT(06)/T(02) TANK (IUGT06)

| | | | | | | |
|--------|--------|---------|--------|-------------------|-------|-----------|
| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
| ○ | .900 | 315.000 | 18.980 | ALPHA | 5.000 | BETA .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, H_i/H_u

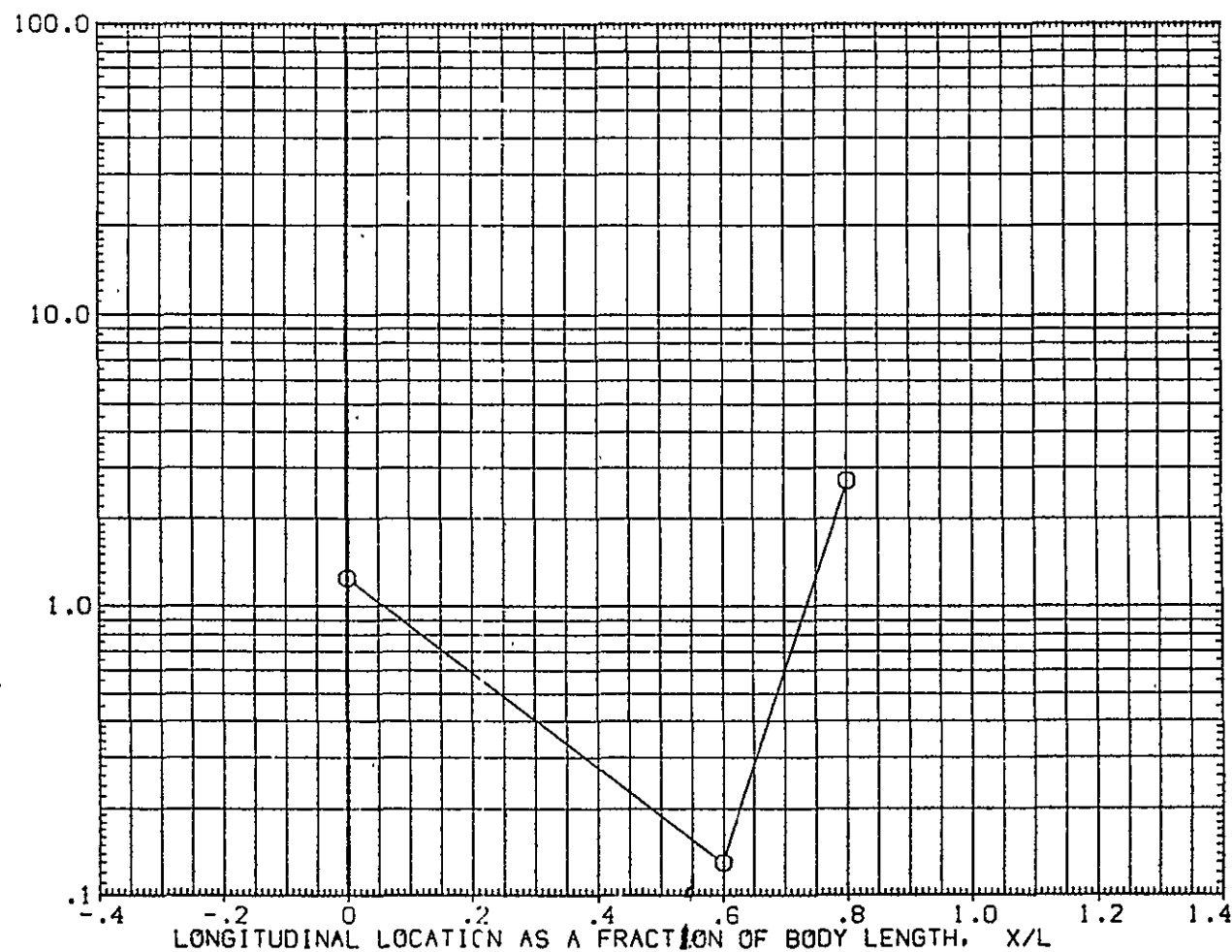


FIG. 5 EFFECT OF RECOVERY FACTOR ON THE EXTERNAL TANK HEAT TRANSFER ALPHA = 5

OH12/IH21 (C/L HST 173-100) 37 T-NP TANK (RUGT03)

| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
|--------|--------|------|--------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| ◇ | .850 | .000 | 18.430 | .000 | .000 | .000 |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, h/h_{REF}

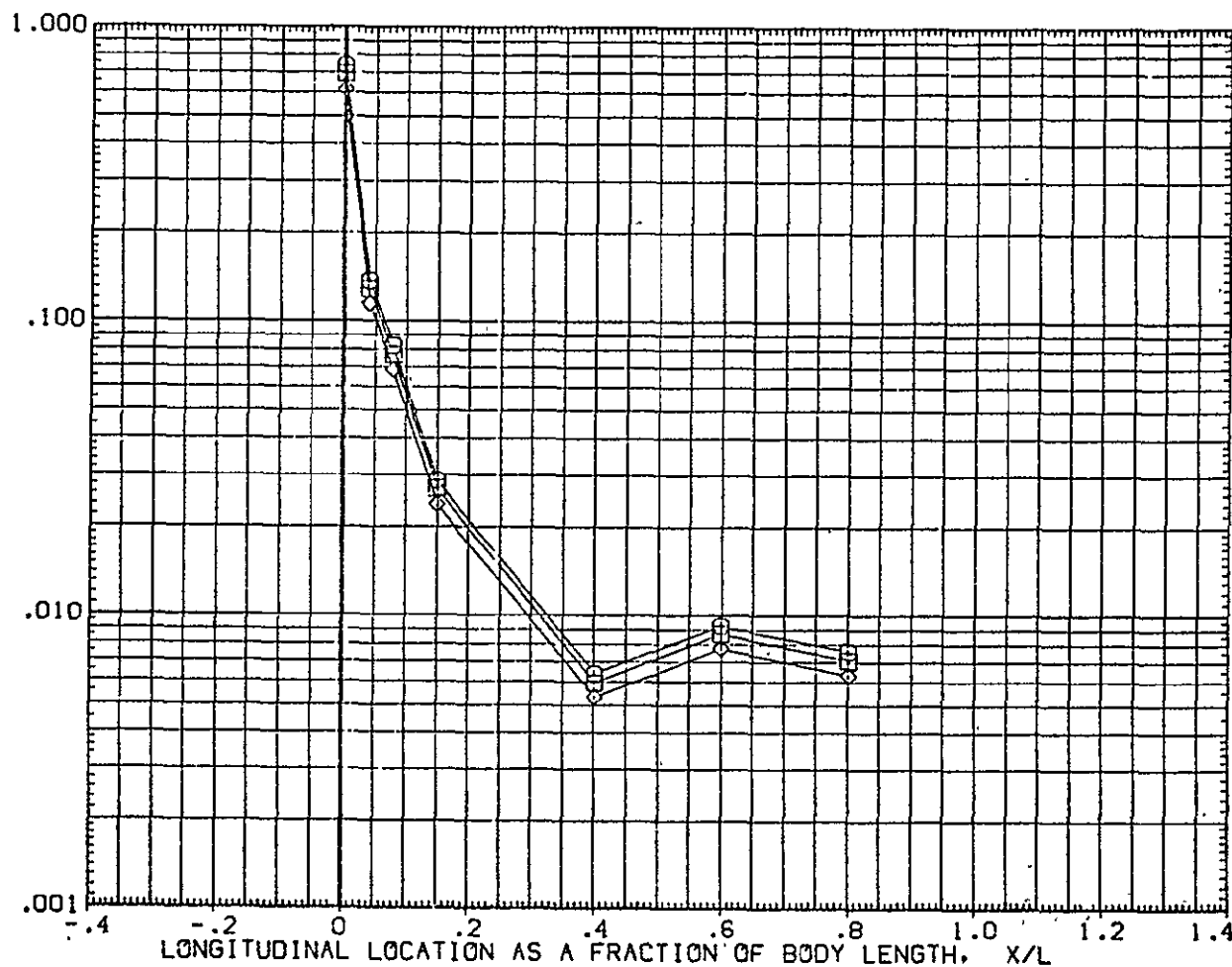


FIG. 6 EFFECT OF RECOVERY FACTOR ON E. TANK HEAT TRANSFER WITHOUT PROTUBERANCES

REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR

ØH12/IH21 (CAL HST 173-100) 37 T-NP TANK (RUGT03)

| | | | | | | |
|--------|--------|---------|--------|-------------------|------|-----------|
| SYMBOL | HAU/HT | PHI | MACH | PARAMETRIC VALUES | | |
| | .850 | 180.000 | 18.430 | ALPHA | .000 | BETA .000 |
| | .900 | | | | | |
| | 1.000 | | | | | |

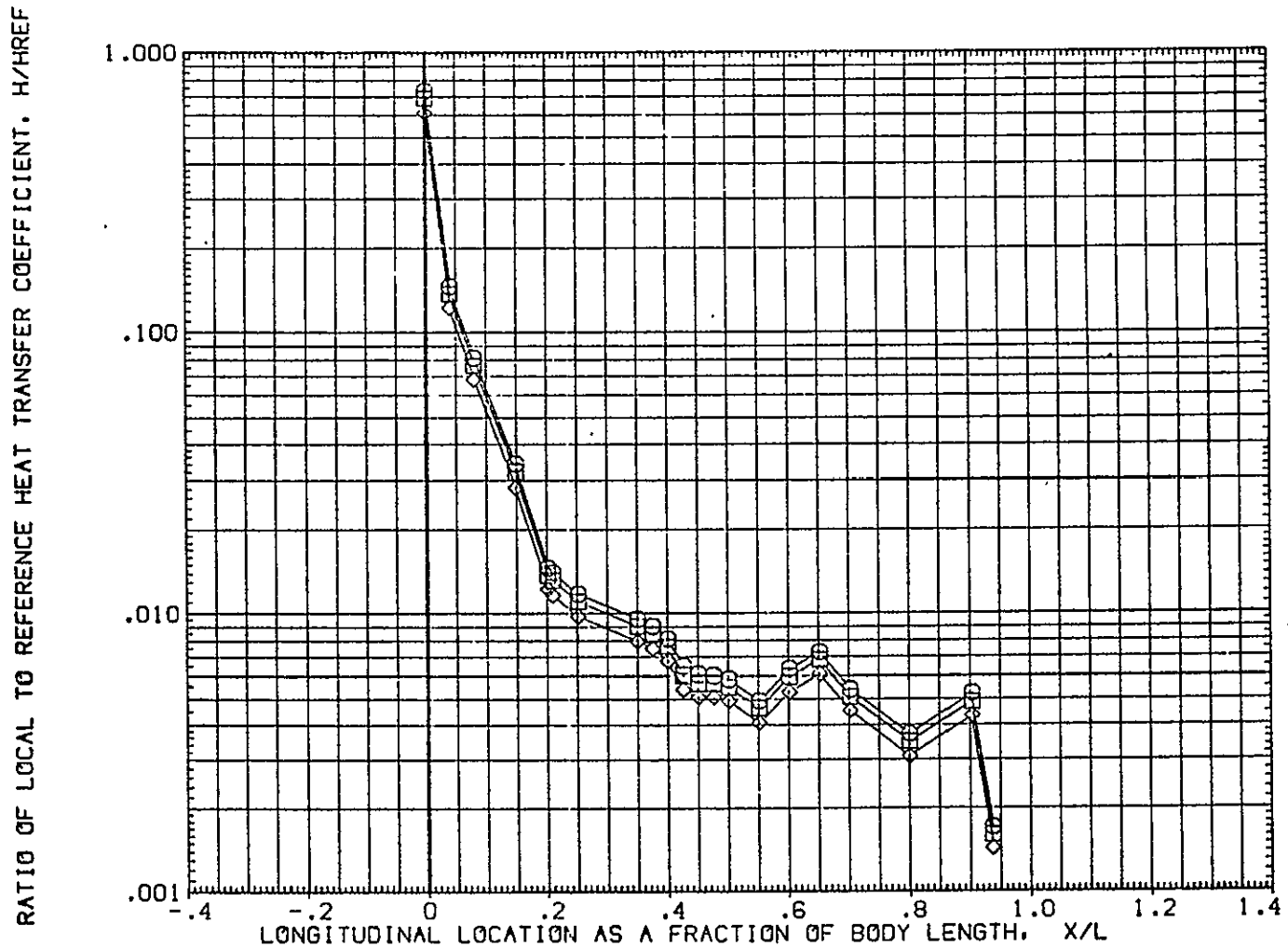


FIG. 6 EFFECT OF RECOVERY FACTOR ON E. TANK HEAT TRANSFER WITHOUT PROTUBERANCES

GH12/IH21 (CAL HST 173-100) 37 T-NP TANK (RUGT03)

| | | | | | | | |
|--------|--------|---------|--------|-------|-------------------|------|------|
| SYMBOL | HAW/HT | PHI | MACH | ALPHA | PARAMETRIC VALUES | | |
| ◇ | .850 | 199.000 | 18.430 | | .000 | BETA | .000 |
| □ | .900 | | | | | | |
| ○ | 1.000 | | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, h/h_{REF}

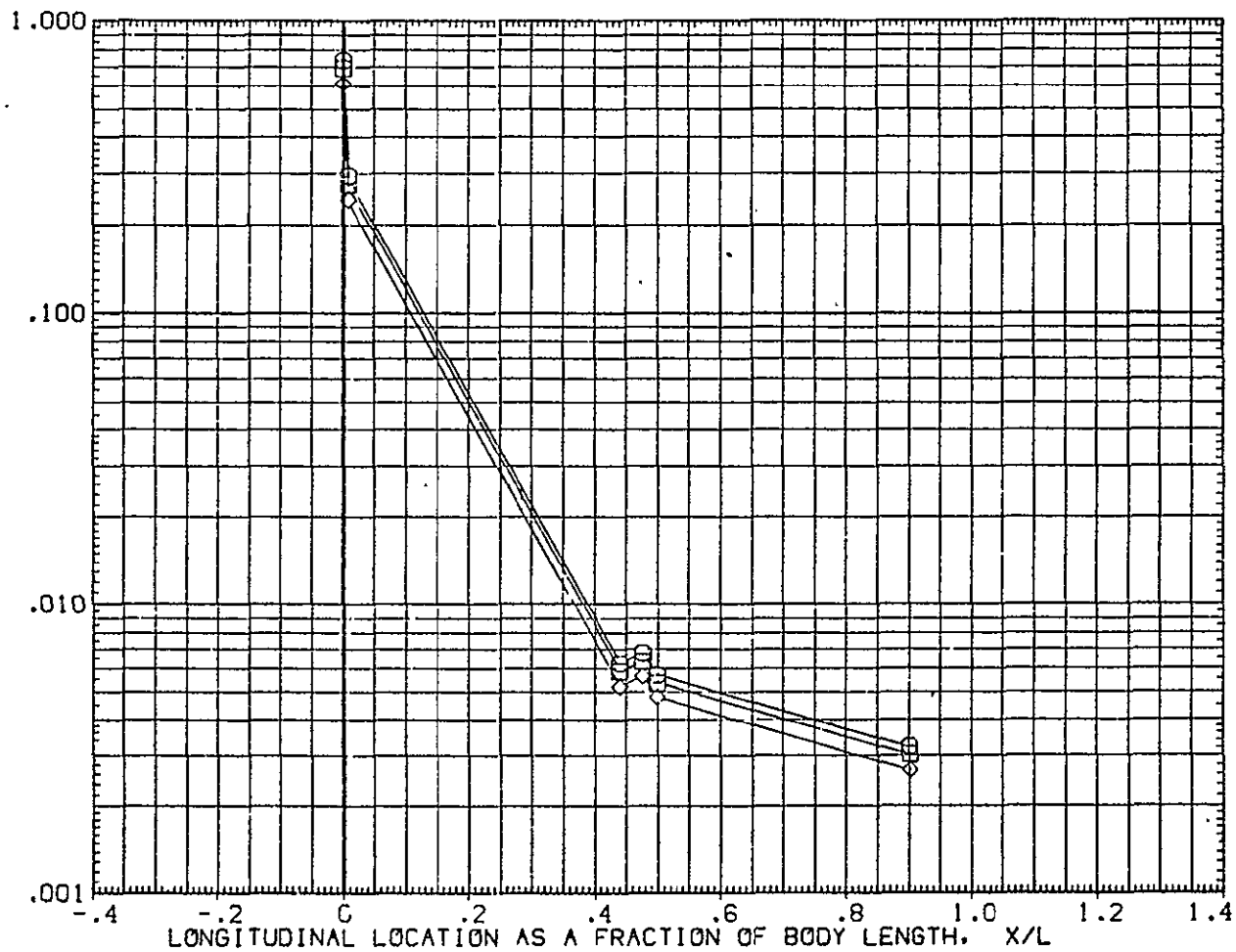


FIG. 6 EFFECT OF RECOVERY FACTOR ON E. TANK HEAT TRANSFER WITHOUT PROTUBERANCES

0H12/1H21 (CAL HST 173-100) 37 T-NP TANK (RUGT03)

| | | | | | | |
|--------|--------|---------|--------|-------------------|------|------|
| SYMBOL | NAV/HT | PHI | MACH | PARAMETRIC VALUES | | |
| ○ | .850 | 221.000 | 18.430 | ALPHA | .000 | BETA |
| □ | .900 | | | | | .000 |
| ◇ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, h/h_{REF}

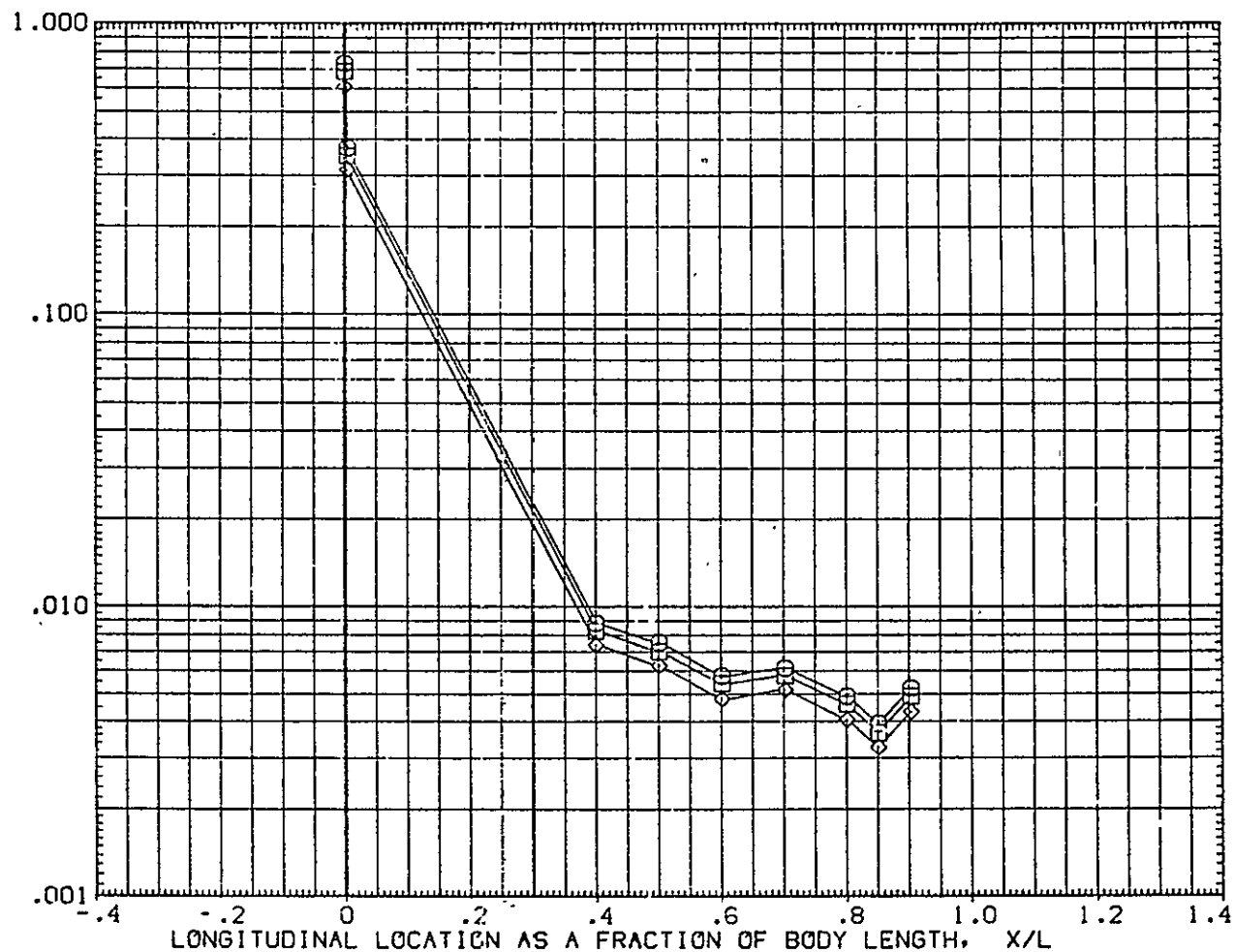


FIG. 6 EFFECT OF RECOVERY FACTOR ON E. TANK HEAT TRANSFER WITHOUT PROTUBERANCES

0H12/1H21 (CAL HST 173-100) 37 T-NP TANK (RUGT03)

| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
|--------|--------|---------|--------|-------------------|------|--|
| | | | | ALPHA | BETA | |
| ○ | .850 | 241.000 | 18.430 | | | |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

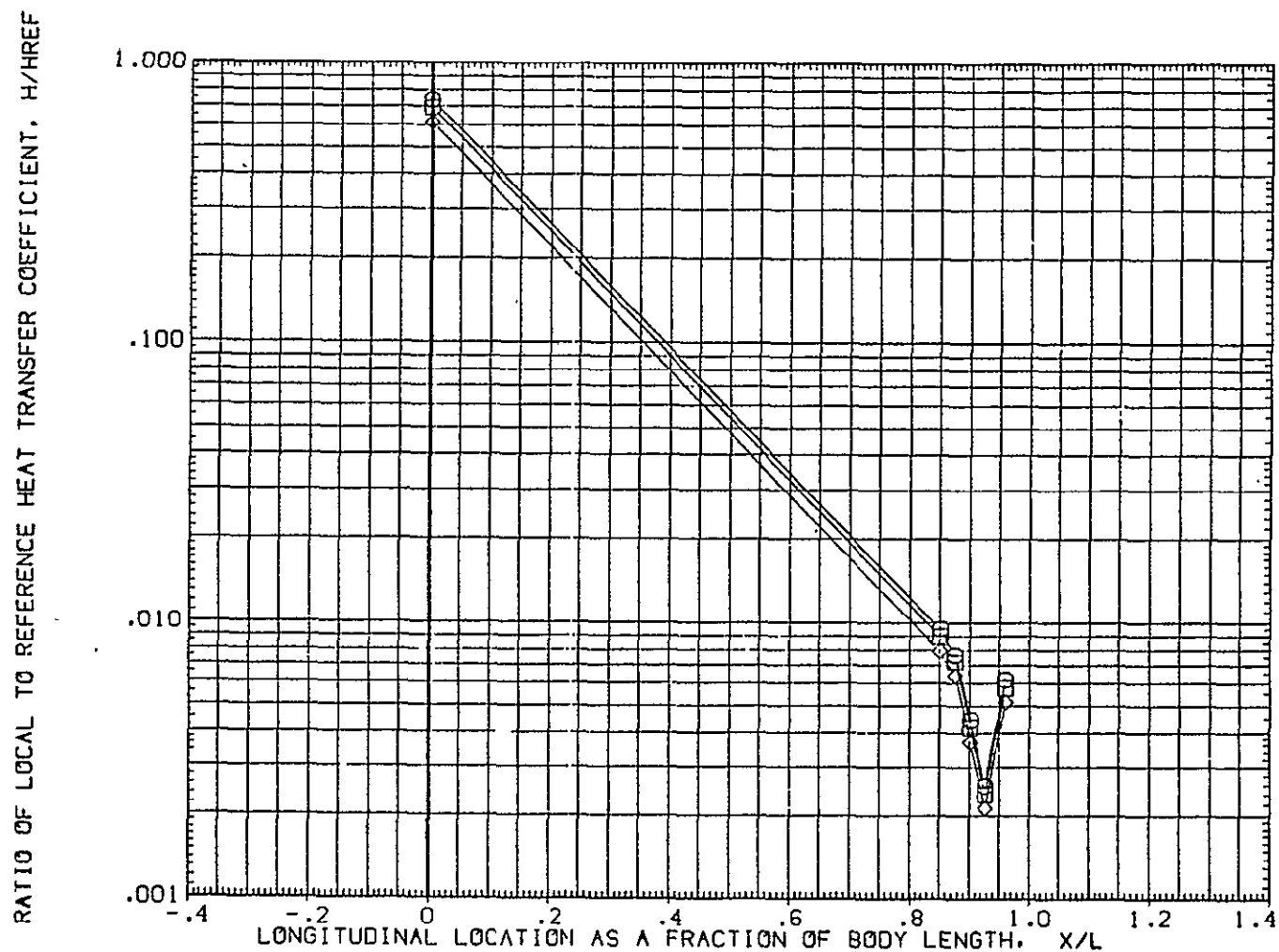


FIG. 6 EFFECT OF RECOVERY FACTOR ON E. TANK HEAT TRANSFER WITHOUT PROTUBERANCES

OH12/1H21 (CAL HST 173-100) 37 T-NP TANK (RUGT03)

| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
|--------|--------|---------|--------|-------------------|------|------|
| □ | .850 | 247.000 | 18.430 | ALPHA | .000 | BETA |
| ◇ | .900 | | | | | |
| | 1.000 | | | | | .000 |

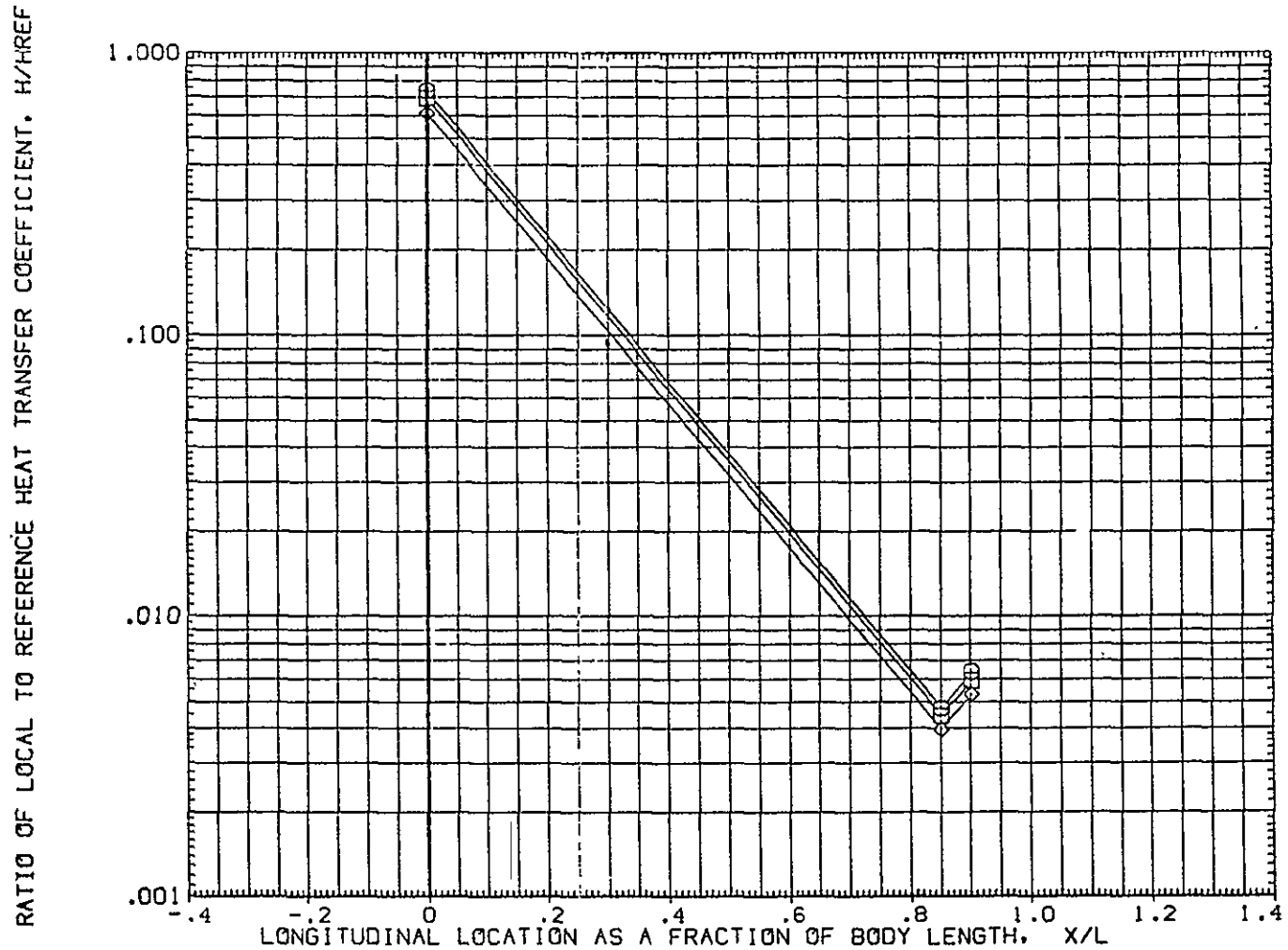


FIG. 6 EFFECT OF RECOVERY FACTOR ON E. TANK HEAT TRANSFER WITHOUT PROTUBERANCES

0H12/1H21 (CAL HST 173-100) 37 T-NP TANK (RUGT03)

| SYMBOL | HAV/HT | PHI | MACH | PARAMETRIC VALUES |
|--------|--------|---------|--------|----------------------|
| ○ | .850 | 270.000 | 18.430 | ALPHA .000 BETA .000 |
| □ | .900 | | | |
| ◇ | 1.000 | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

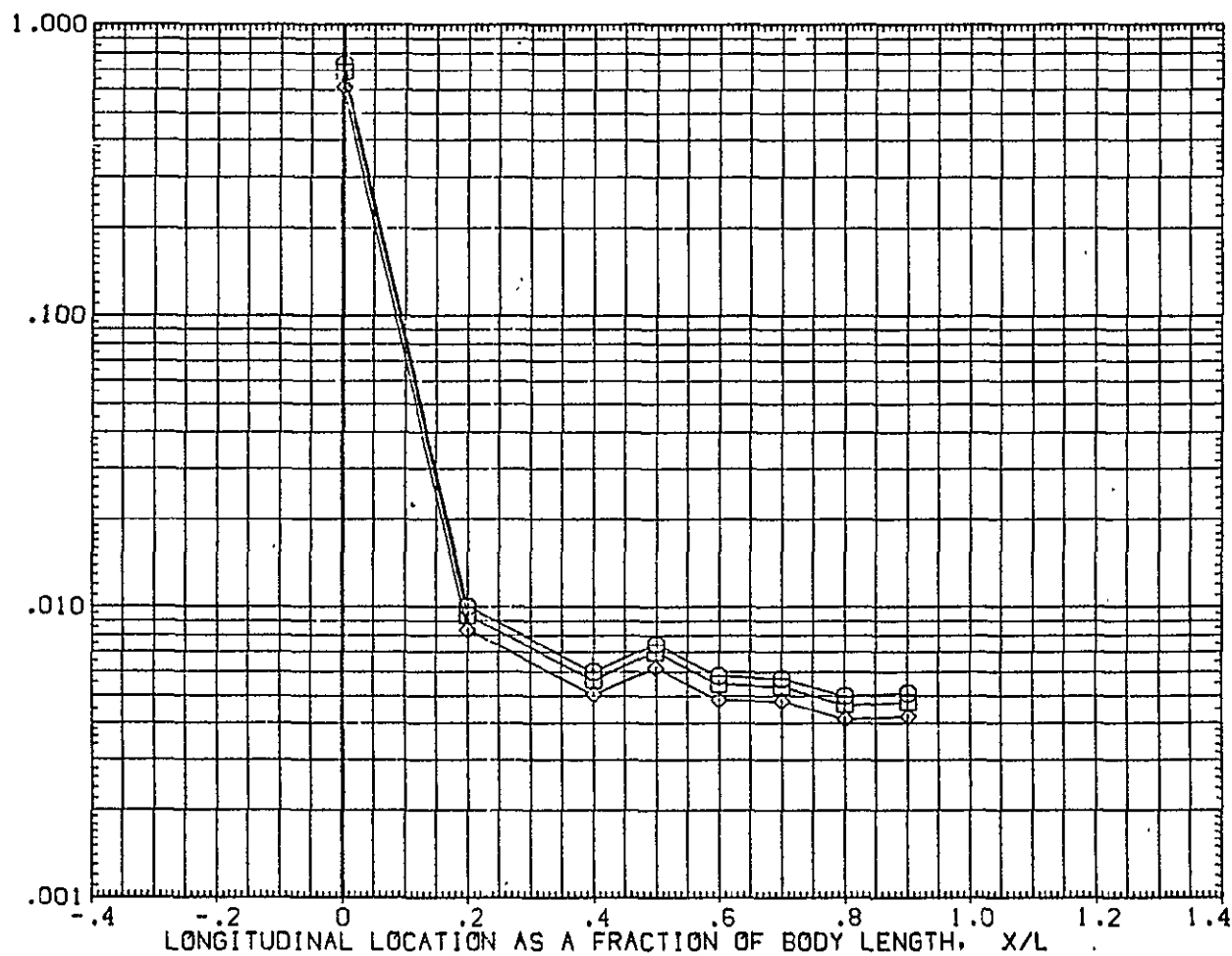


FIG. 6 EFFECT OF RECOVERY FACTOR ON E. TANK HEAT TRANSFER WITHOUT PROTUBERANCES

0H12/IH21 (CAL HST 173-100) 37 T-NP TANK (RUGT03)

| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
|--------|--------|---------|--------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| ◇ | .850 | 315.000 | 18.430 | .000 | .000 | .000 |
| □ | .900 | | | | | |
| ○ | 1.000 | | | | | |

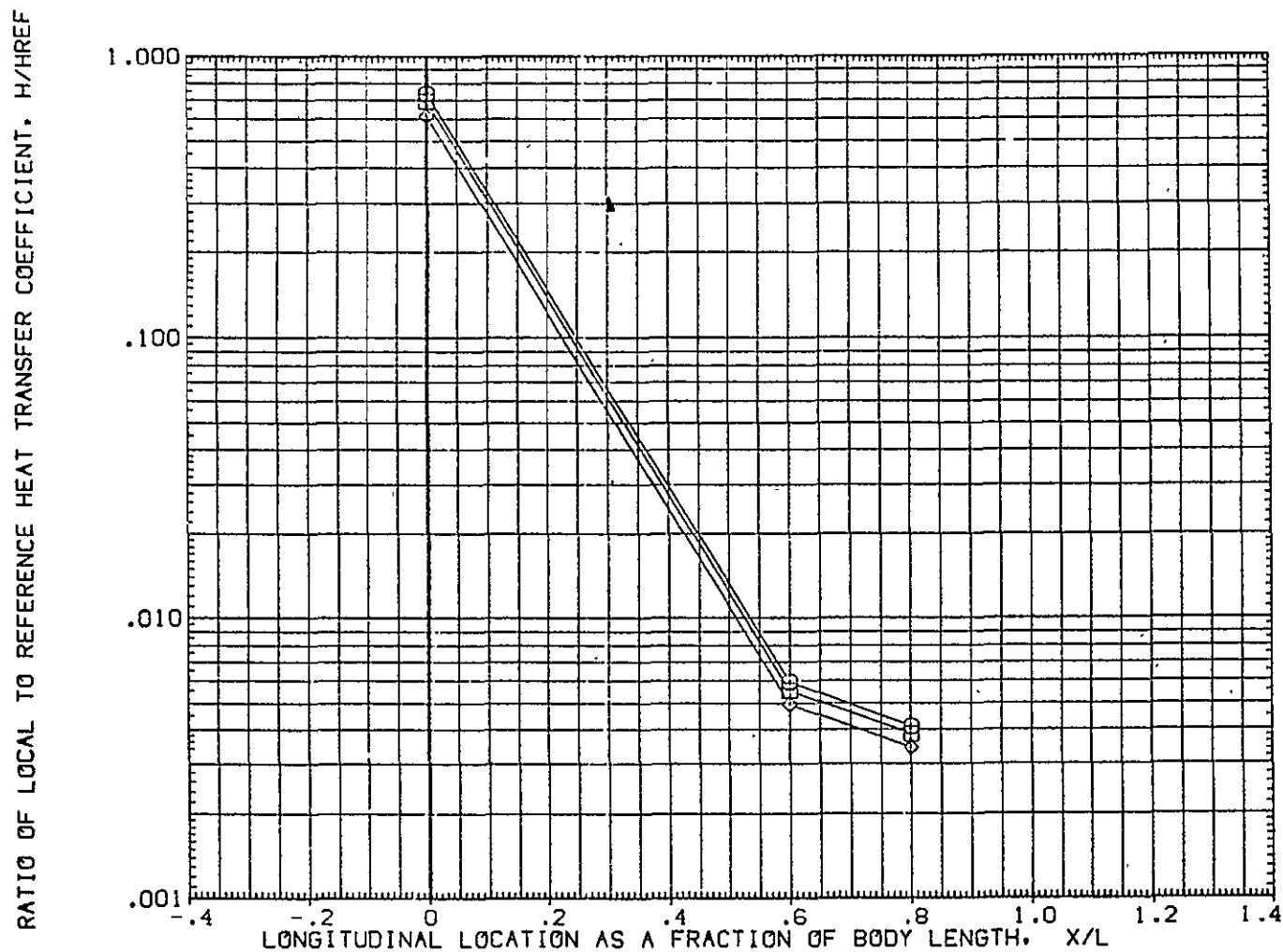


FIG. 6 EFFECT OF RECOVERY FACTOR ON E. TANK HEAT TRANSFER WITHOUT PROTUBERANCES

OH12/H21 (CAL HST 173-100) 37 0 T-NP TANK

(RUGT04)

| SYMBOL | HAW/HT | PHI | MACH | ALPHA | PARAMETRIC VALUES | BETA |
|--------|--------|------|--------|-------|-------------------|------|
| ○ | .850 | .000 | 17.920 | | | |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

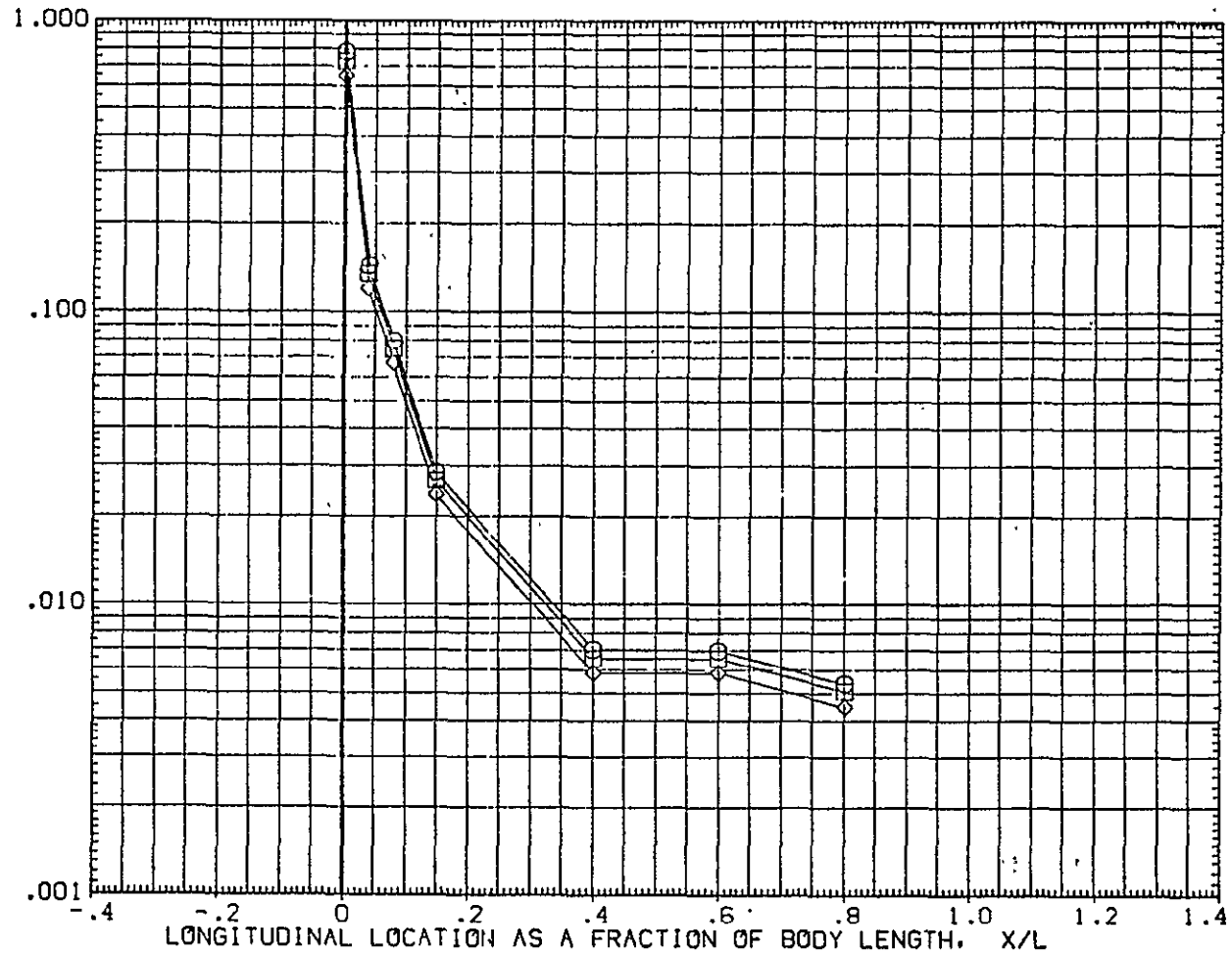


FIG. 6 EFFECT OF RECOVERY FACTOR ON E. TANK HEAT TRANSFER WITHOUT PROTUBERANCES

0H12/IH21 (CAL HST 173-100) 37 0 T-NP TANK (RUGT04)

| | | | | | | |
|--------|--------|---------|--------|-------------------|------|------|
| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
| | .850 | 180.000 | 17.920 | ALPHA | .000 | BETA |
| | .900 | | | | | .000 |
| | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

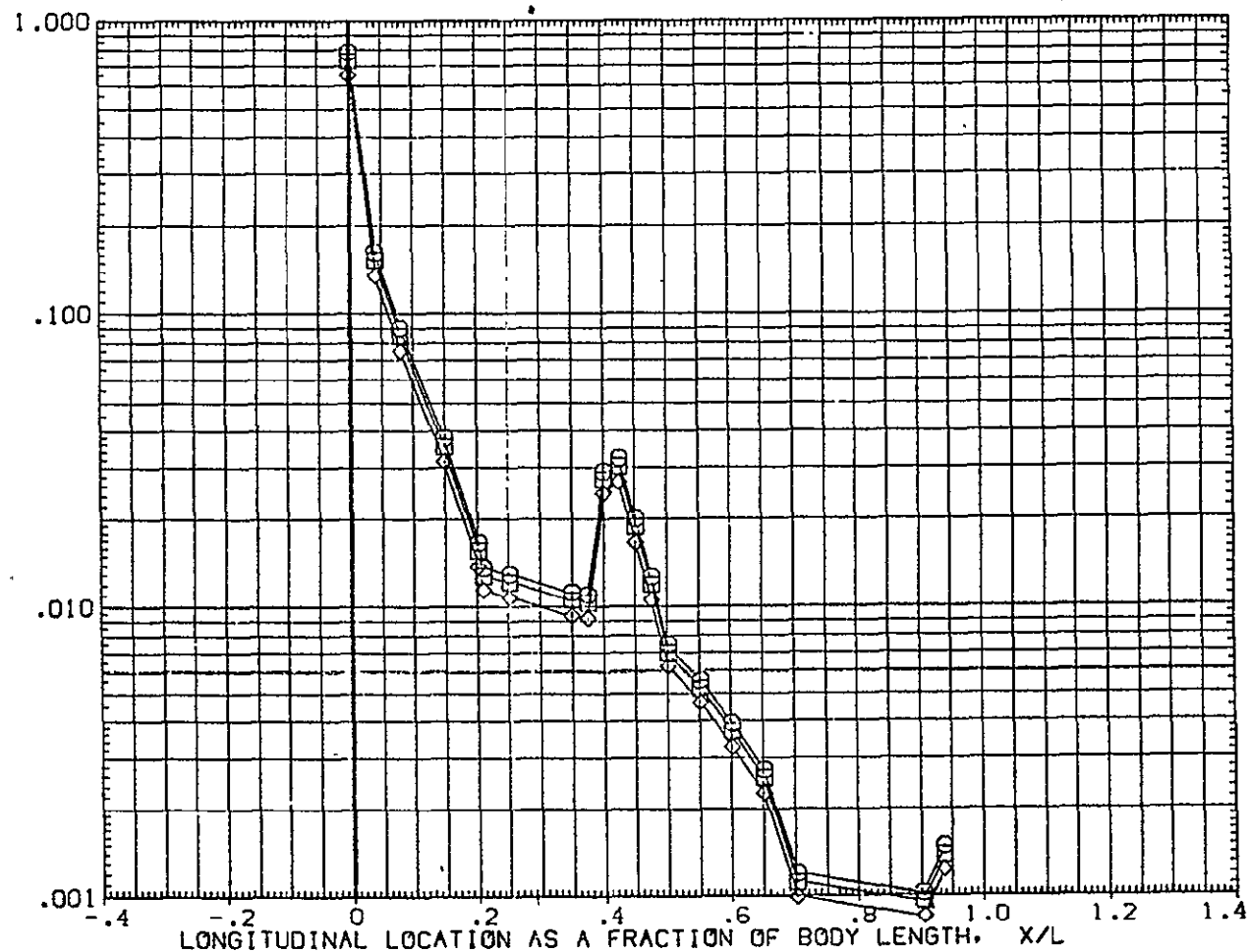


FIG. 6 EFFECT OF RECOVERY FACTOR ON E. TANK HEAT TRANSFER WITHOUT PROTUBERANCES

C-3

0H12/1H21 (CAL HST 173-100) 37 0 T-NP TANK (RUGT04)

| SYMBOL | HAW/HT | PHI | MACH | ALPHA | PARAMETRIC VALUES | | |
|--------|--------|---------|--------|-------|-------------------|------|--|
| ◇ | .850 | 199.000 | 17.920 | .000 | BETA | .000 | |
| □ | .900 | | | | | | |
| ◇ | 1.000 | | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

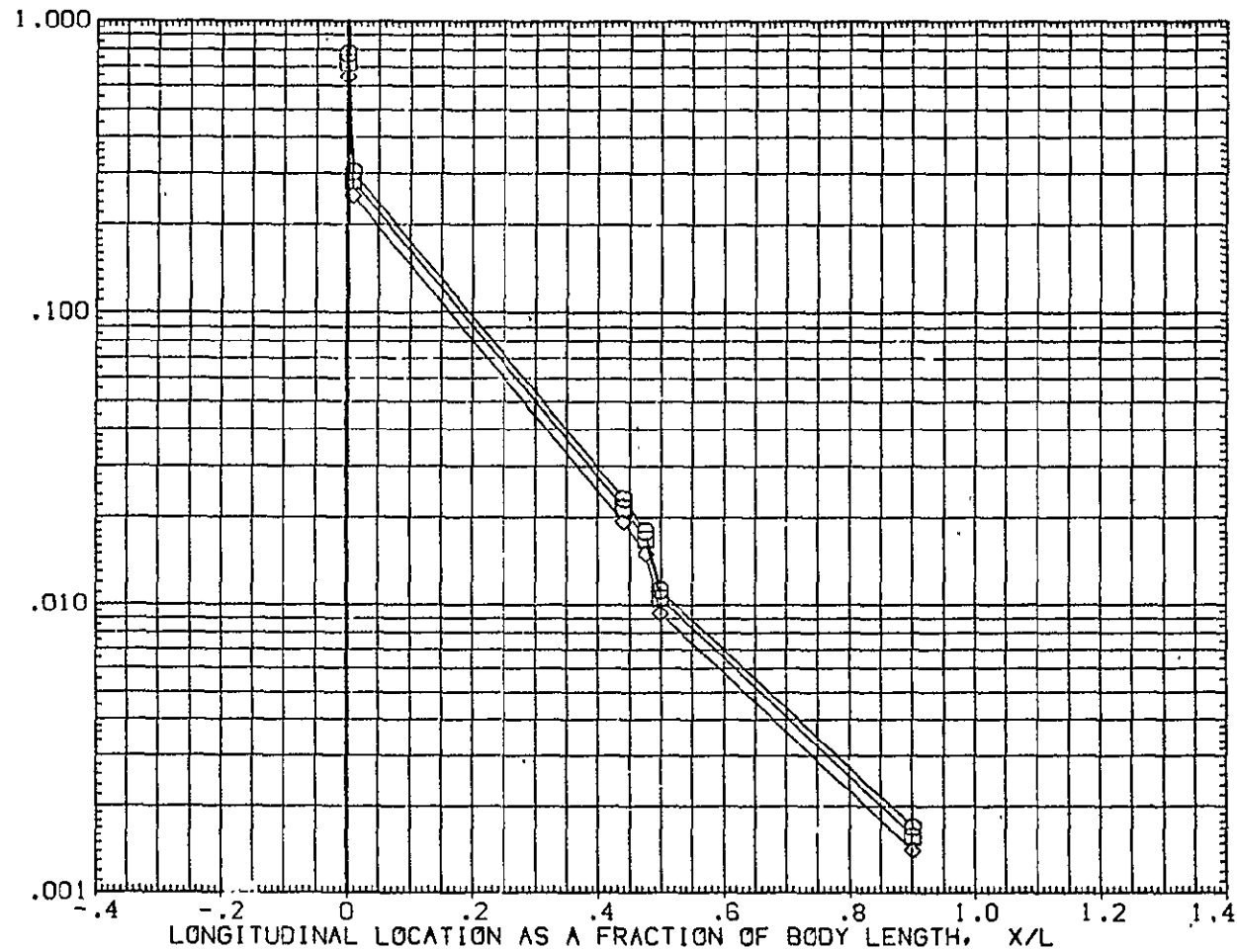


FIG. 6 EFFECT OF RECOVERY FACTOR ON E. TANK HEAT TRANSFER WITHOUT PROTUBERANCES

OH12/IH21 (CAL HST 173-100) 37 0 T-NP TANK

(RUGT04)

| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
|--------|--------|---------|--------|-------------------|------|--|
| | | | | ALPHA | BETA | |
| ○ | .850 | 221.000 | 17.920 | | | |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

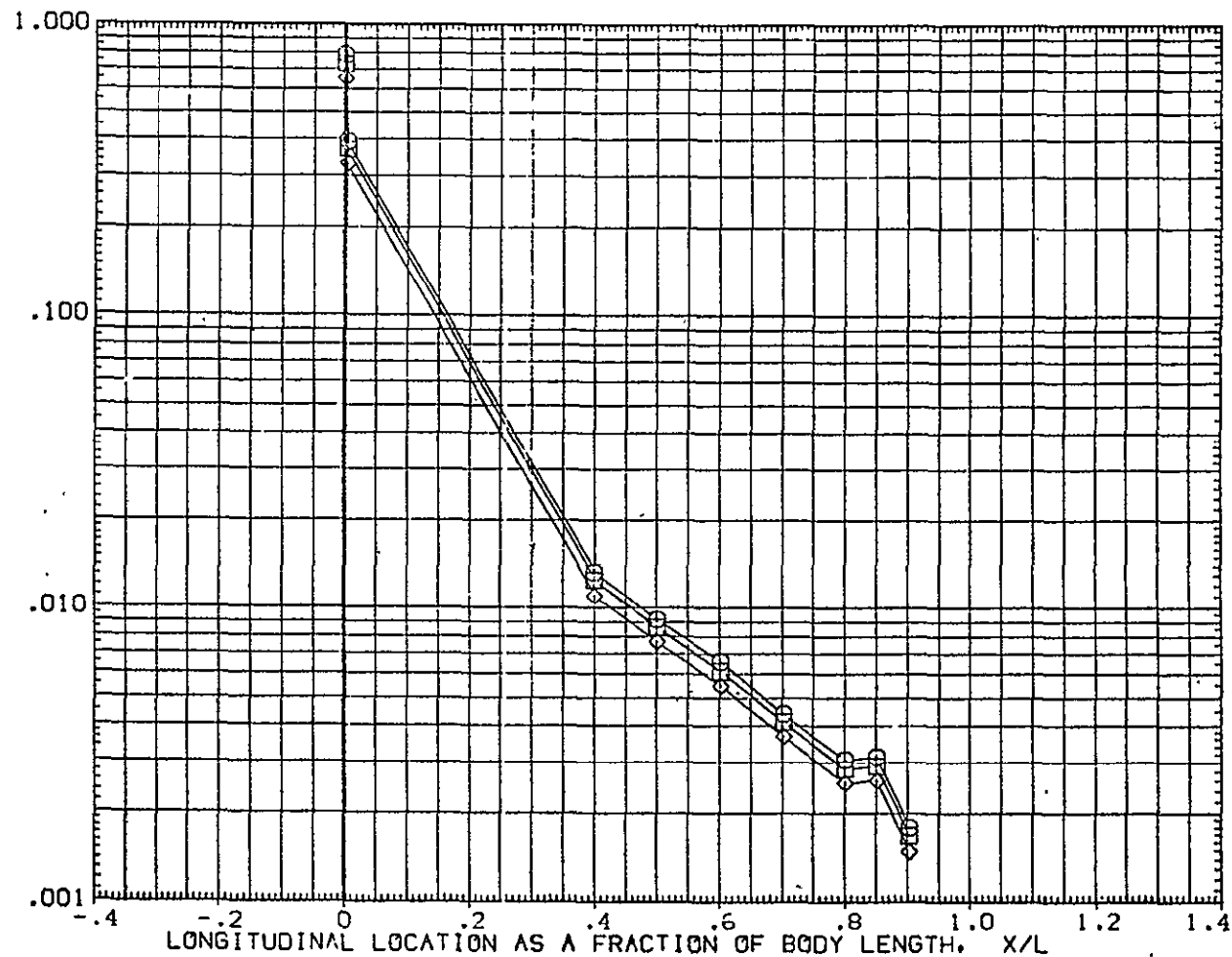


FIG. 6 EFFECT OF RECOVERY FACTOR ON E. TANK HEAT TRANSFER WITHOUT PROTUBERANCES

0H12/1H21 (CAL HST 173-100) 37 0 T-NP TANK

(RUGT04)

SYMBOL
○ □ ◇

| HAU/HT | PHI | MACH |
|--------|---------|--------|
| .850 | 241.000 | 17.920 |
| .900 | | |
| 1.000 | | |

| PARAMETRIC VALUES | | |
|-------------------|------|------|
| ALPHA | BETA | BETA |
| .000 | | .000 |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, h/h_{REF}

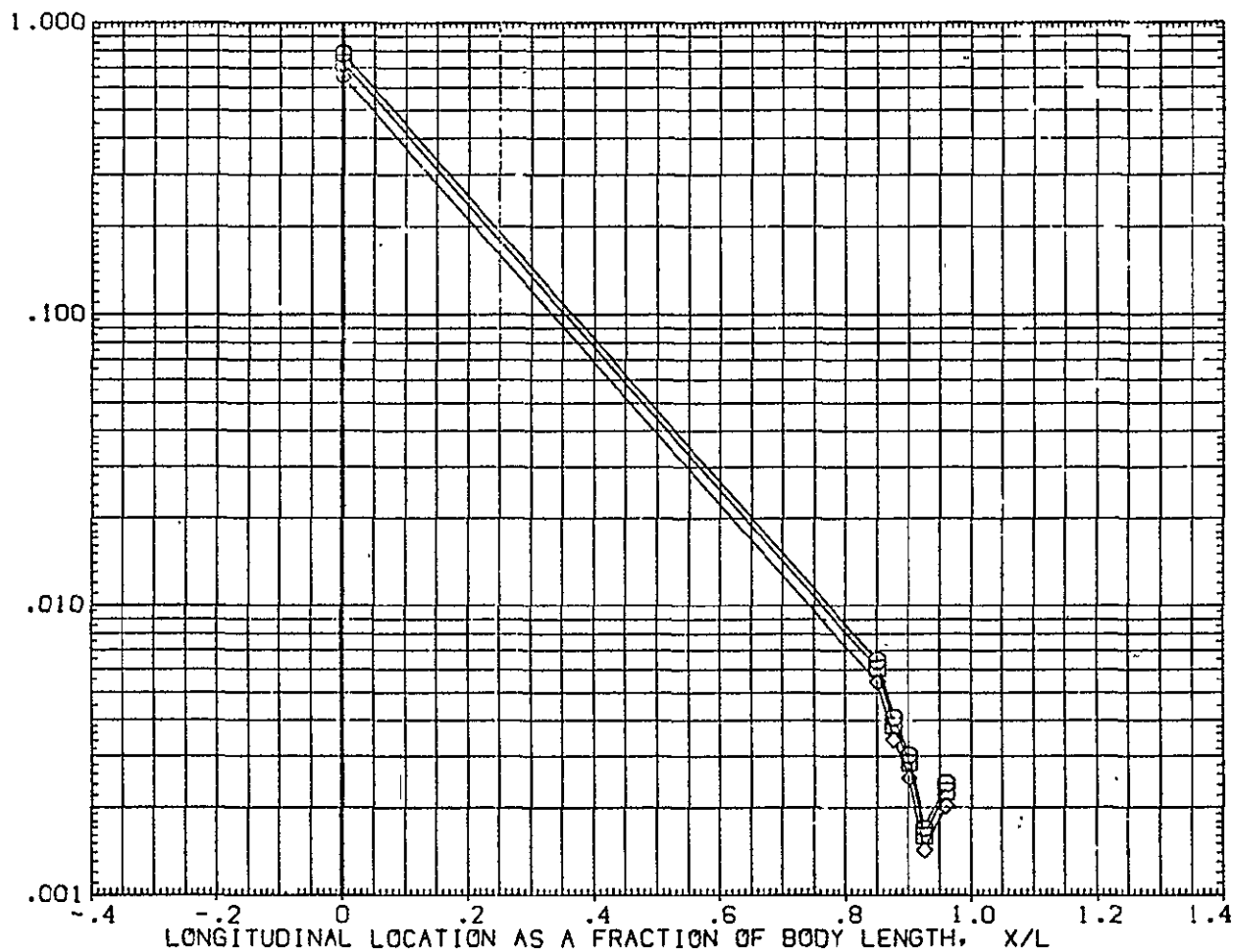


FIG. 6 EFFECT OF RECOVERY FACTOR ON E. TANK HEAT TRANSFER WITHOUT PROTUBERANCES

REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR

0H12/IH21 (CAL HST 173-100) 37 ° T-NP TANK (RUGT04)

| SYMBOL | HAW/HT | PHI | MACH | ALPHA | PARAMETRIC VALUES | |
|--------|--------|---------|--------|-------|-------------------|------|
| ◇ | .850 | 247.000 | 17.920 | .000 | BETA | .000 |
| □ | .900 | | | | | |
| ○ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

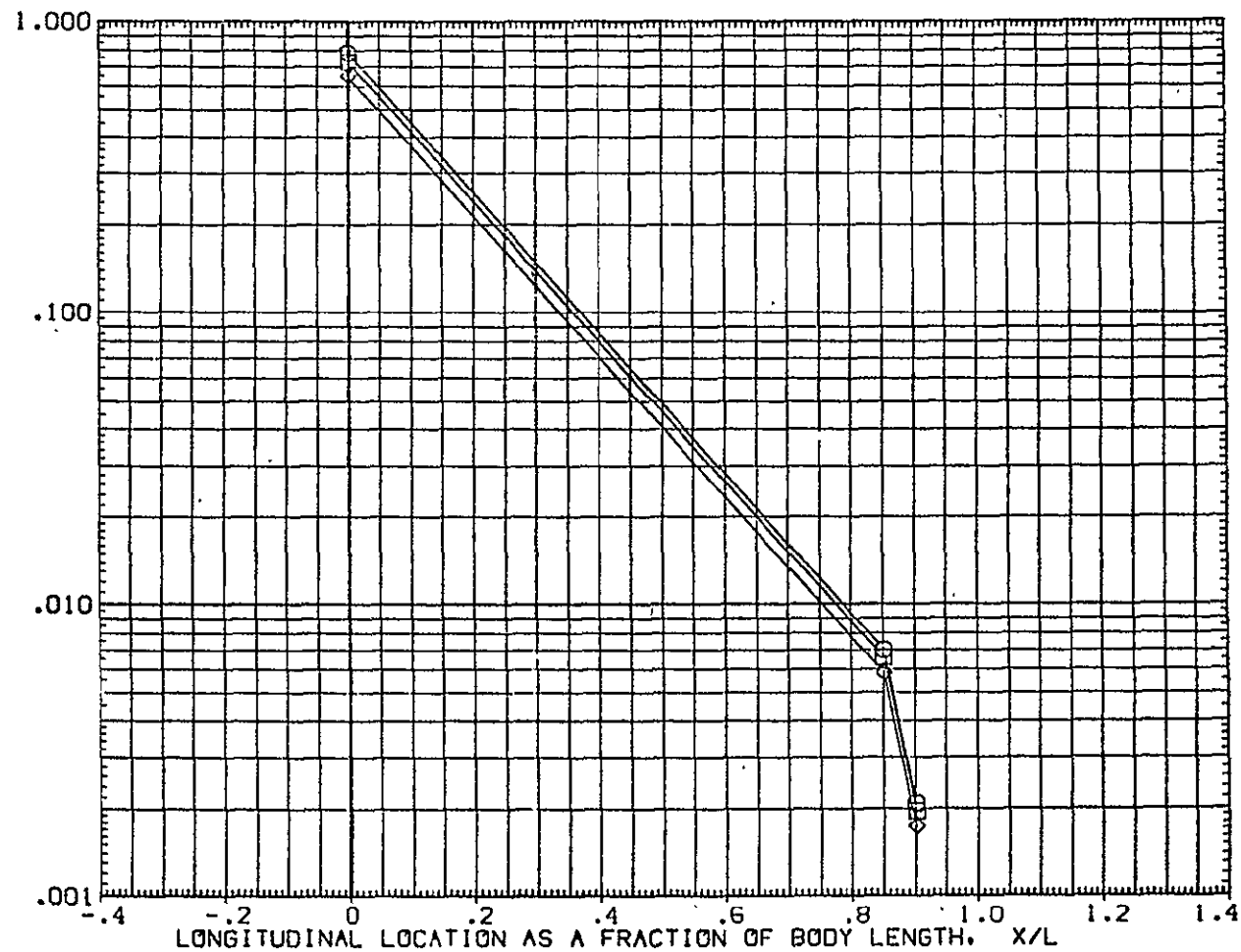


FIG. 6 EFFECT OF RECOVERY FACTOR ON E. TANK HEAT TRANSFER WITHOUT PROTUBERANCES

OH12/IH21 (CAL HST 173-100) 37 0 T-NP TANK (RUGT04)

| | | | | | | |
|--------|--------|---------|--------|-------|-------------------|------|
| SYMBOL | HAW/HT | PHI | MACH | ALPHA | PARAMETRIC VALUES | |
| ○ | .850 | 270.000 | 17.920 | | .000 | BETA |
| □ | .900 | | | | | .000 |
| ◇ | 1.000 | | | | | |

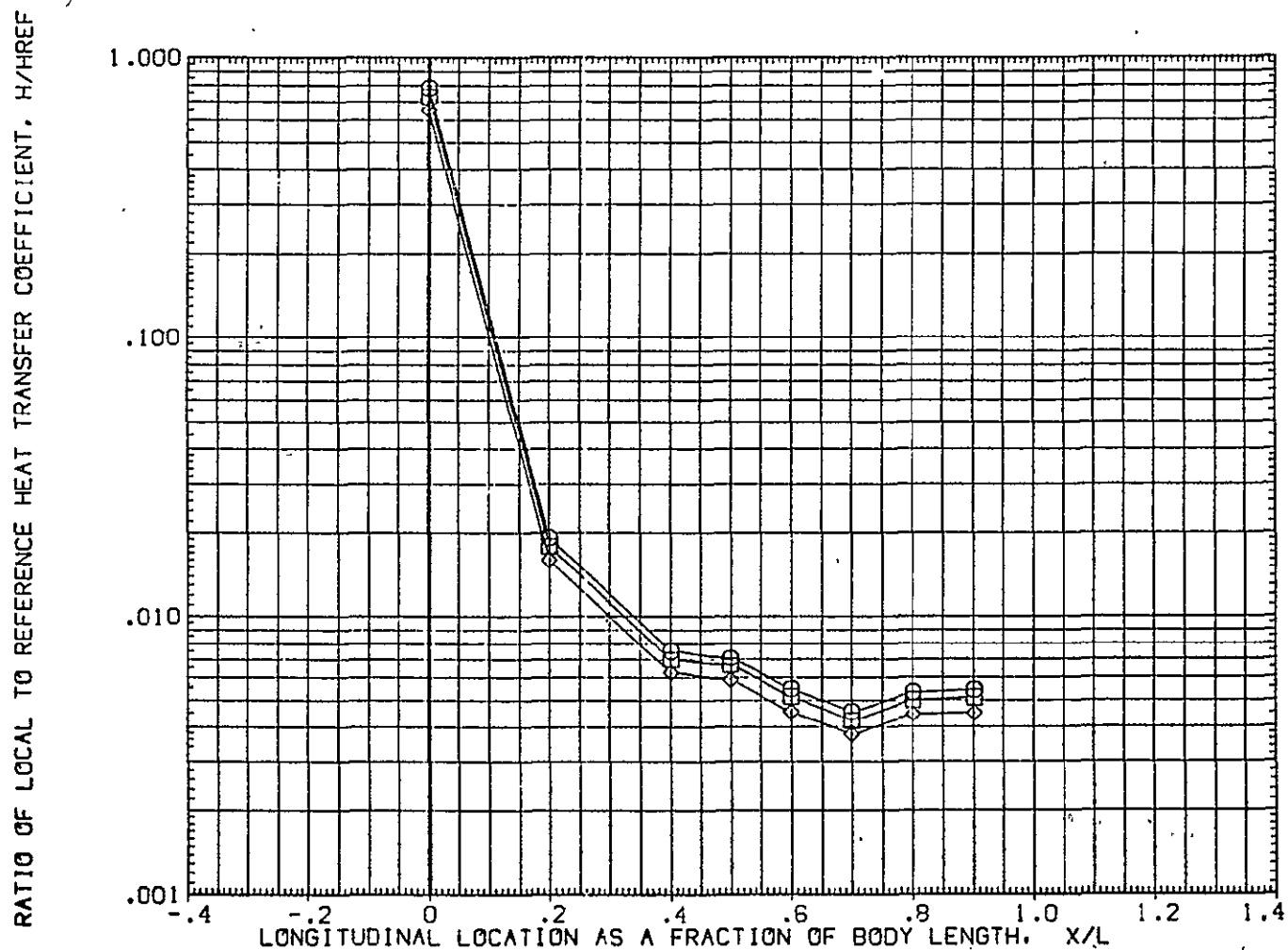


FIG. 6 EFFECT OF RECOVERY FACTOR ON E. TANK HEAT TRANSFER WITHOUT PROTUBERANCES

0H12/IH21 (CAL HST 173-100) 37 0 T-NP TANK (RUGT04)

| | | | | | | |
|--------|--------|---------|--------|-------|-------------------|------|
| SYMBOL | HAW/HT | PHI | MACH | ALPHA | PARAMETRIC VALUES | |
| □ | .850 | 315.000 | 17.920 | | .000 | BETA |
| ◇ | .900 | | | | | .000 |
| ◇ | 1.000 | | | | | |

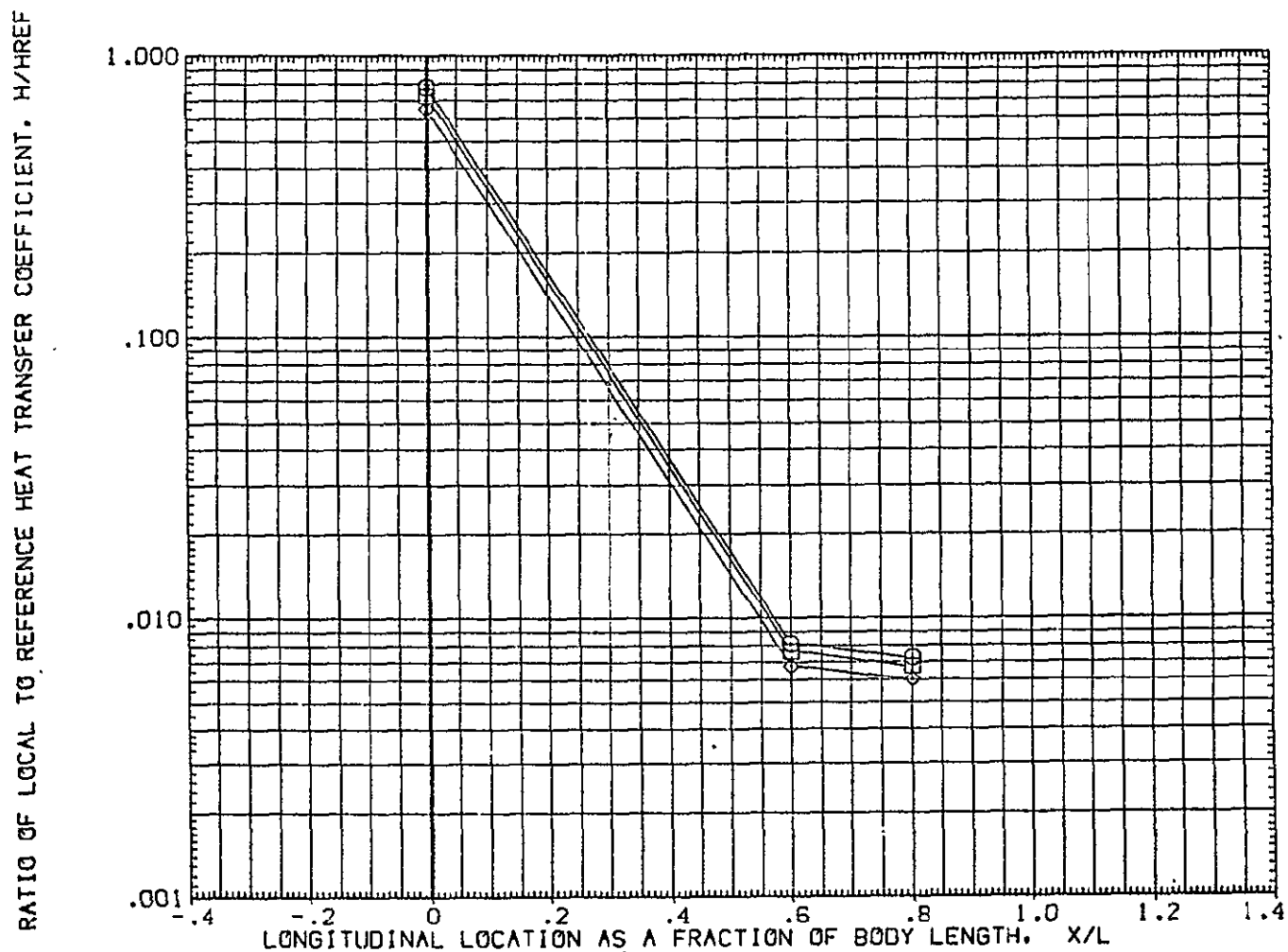


FIG. 6 EFFECT OF RECOVERY FACTOR ON E. TANK HEAT TRANSFER WITHOUT PROTUBERANCES

OH12 + IH21 MODEL 37 OT-NP(4)/T-NP(3) TANK (IUGT04)

| | | | | | | |
|--------|--------|------|--------|-------|-------------------|-----------|
| SYMBOL | HAW/HT | PHI | MACH | ALPHA | PARAMETRIC VALUES | |
| O | .900 | .000 | 18.200 | | .000 | BETA .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU

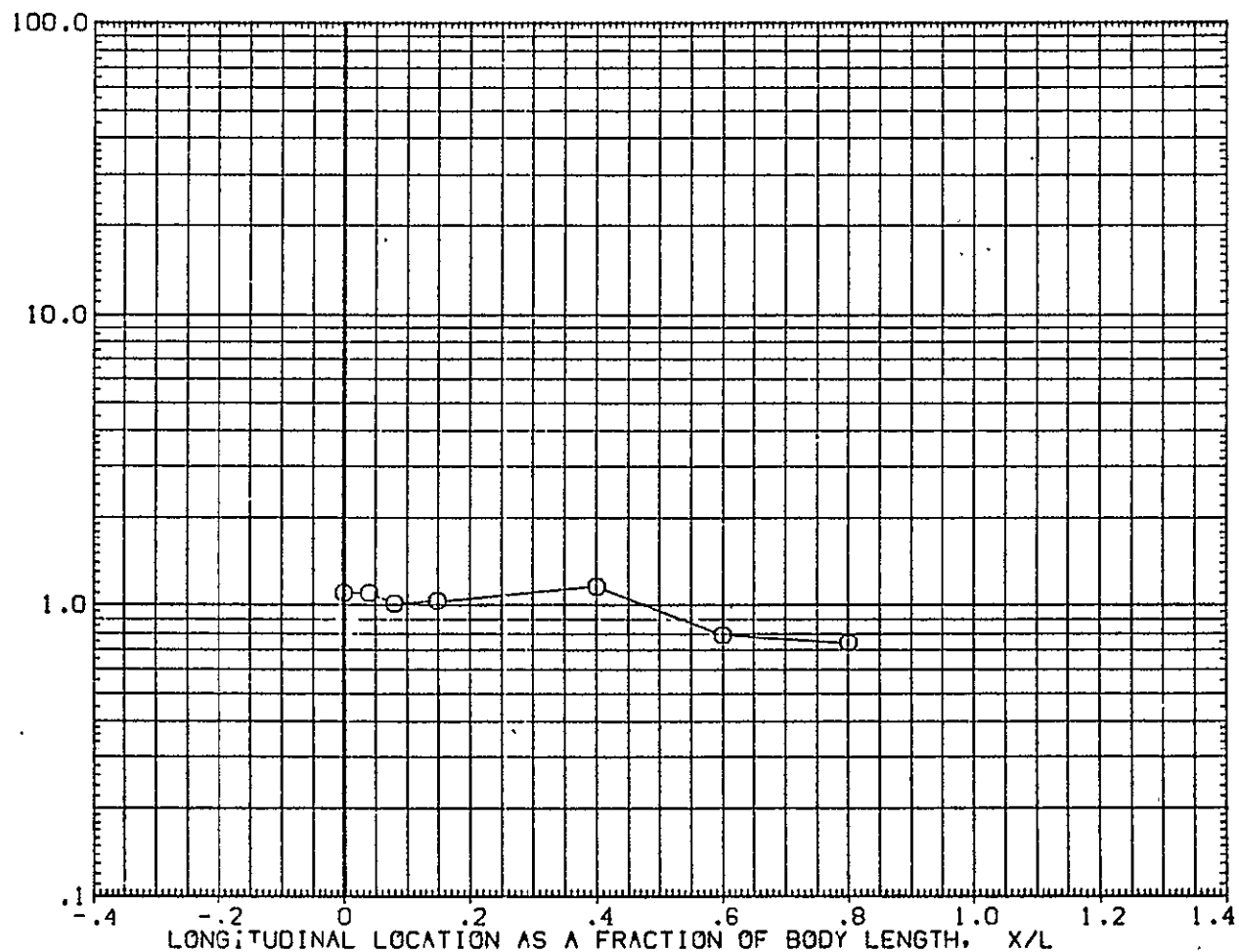


FIG. 6 EFFECT OF RECOVERY FACTOR ON E. TANK HEAT TRANSFER WITHOUT PROTUBERANCES

0H12 + IH21 MODEL 37 OT-NP(4)/T-NP(3) TANK (IUGT04)

SYMBOL HAW/HT PHI MACH
 O .900 180.000 18.200

PARAMETRIC VALUES
 ALPHA .000 BETA .000

RATIO OF INTERFERENCE TO DISTURBED HEAT TRANSFER COEFFICIENT, h_i/h_u

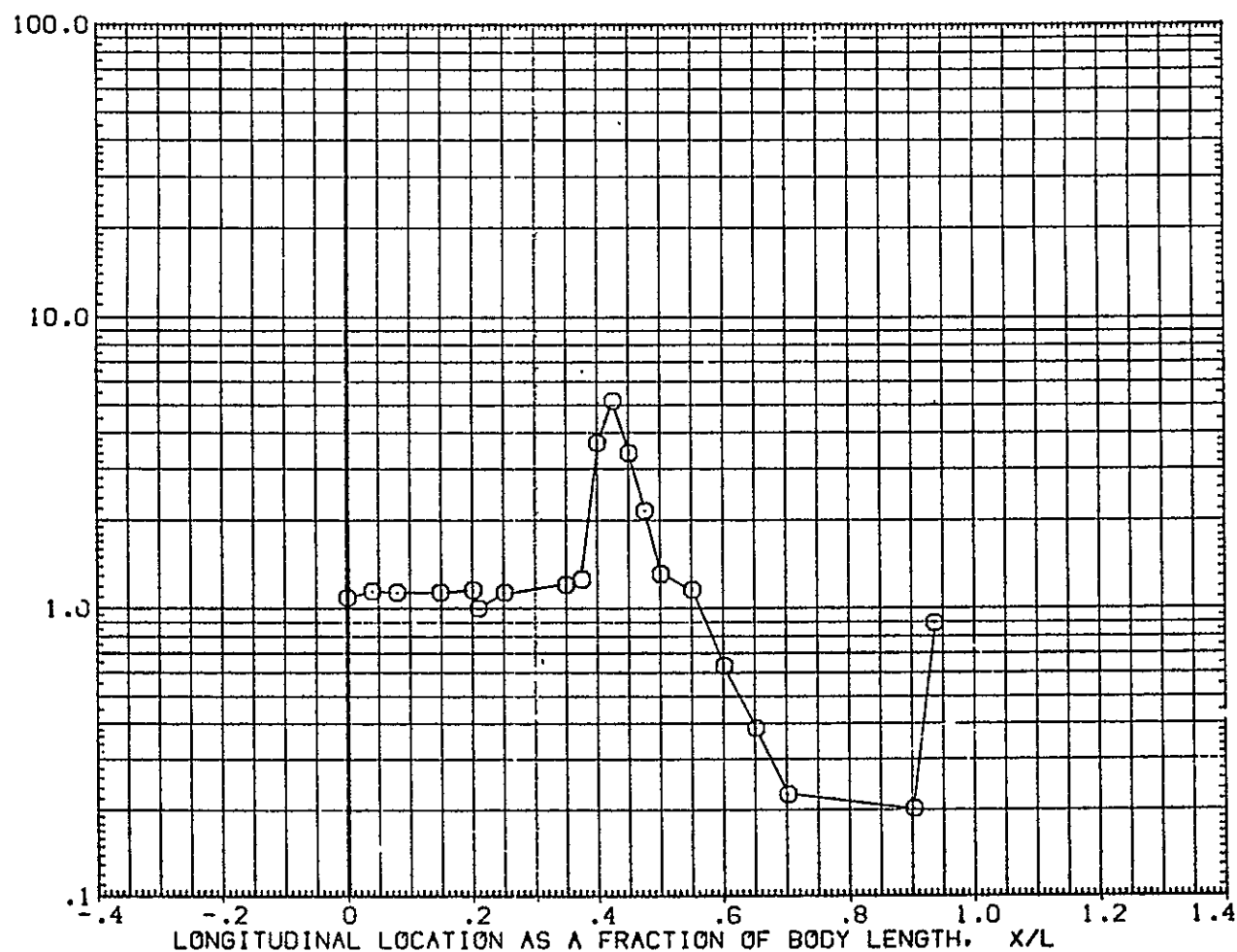


FIG. 6 EFFECT OF RECOVERY FACTOR ON E. TANK HEAT TRANSFER WITHOUT PROTUBERANCES

OH12 + IH21 MODEL 37 OT-NP(4)/T-NP(3) TANK (IUGT04)

| | | | | |
|--------|--------|---------|--------|----------------------|
| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES |
| O | .900 | 199.000 | 18.200 | ALPHA .000 BETA .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU

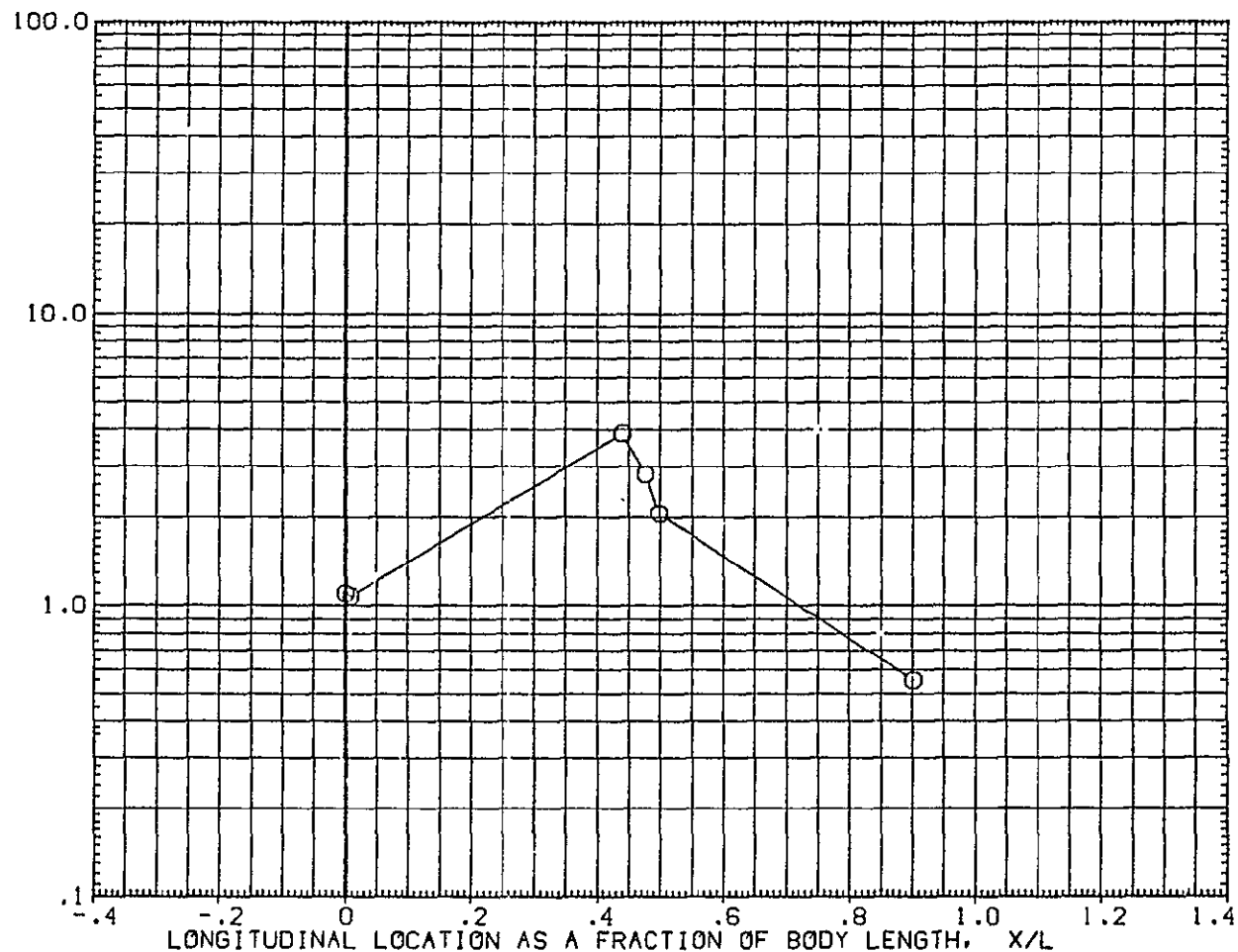


FIG. 6 EFFECT OF RECOVERY FACTOR ON E. TANK HEAT TRANSFER WITHOUT PROTUBERANCES

OH12 + IH21 MODEL 37 OT-NP(4)/T-NP(3) TANK (IUGT04)

| | | | | | | |
|--------|--------|---------|--------|-------------------|------|-----------|
| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
| O | .900 | 221.000 | 18.200 | ALPHA | .000 | BETA .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, H_i/H_u

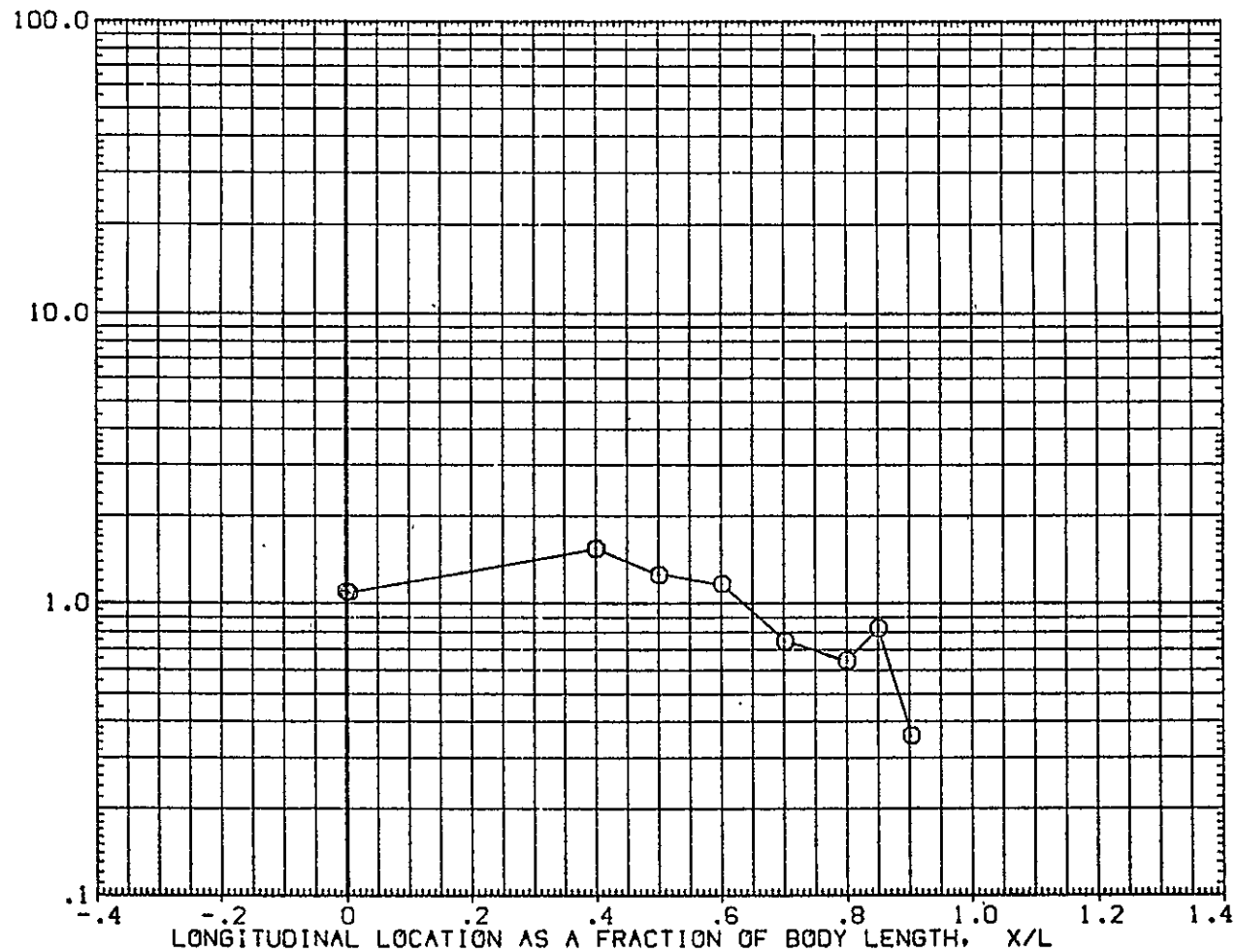


FIG. 6 EFFECT OF RECOVERY FACTOR ON E. TANK HEAT TRANSFER WITHOUT PROTUBERANCES

OH12 + IH21 MODEL 37 OT-NP(4)/T-NP(3) TANK (IUGT04)

SYMBOL
O
HAW/HT .900
PHI 241.000
MACH 18.200

PARAMETRIC VALUES
ALPHA .000
BETA .000

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU

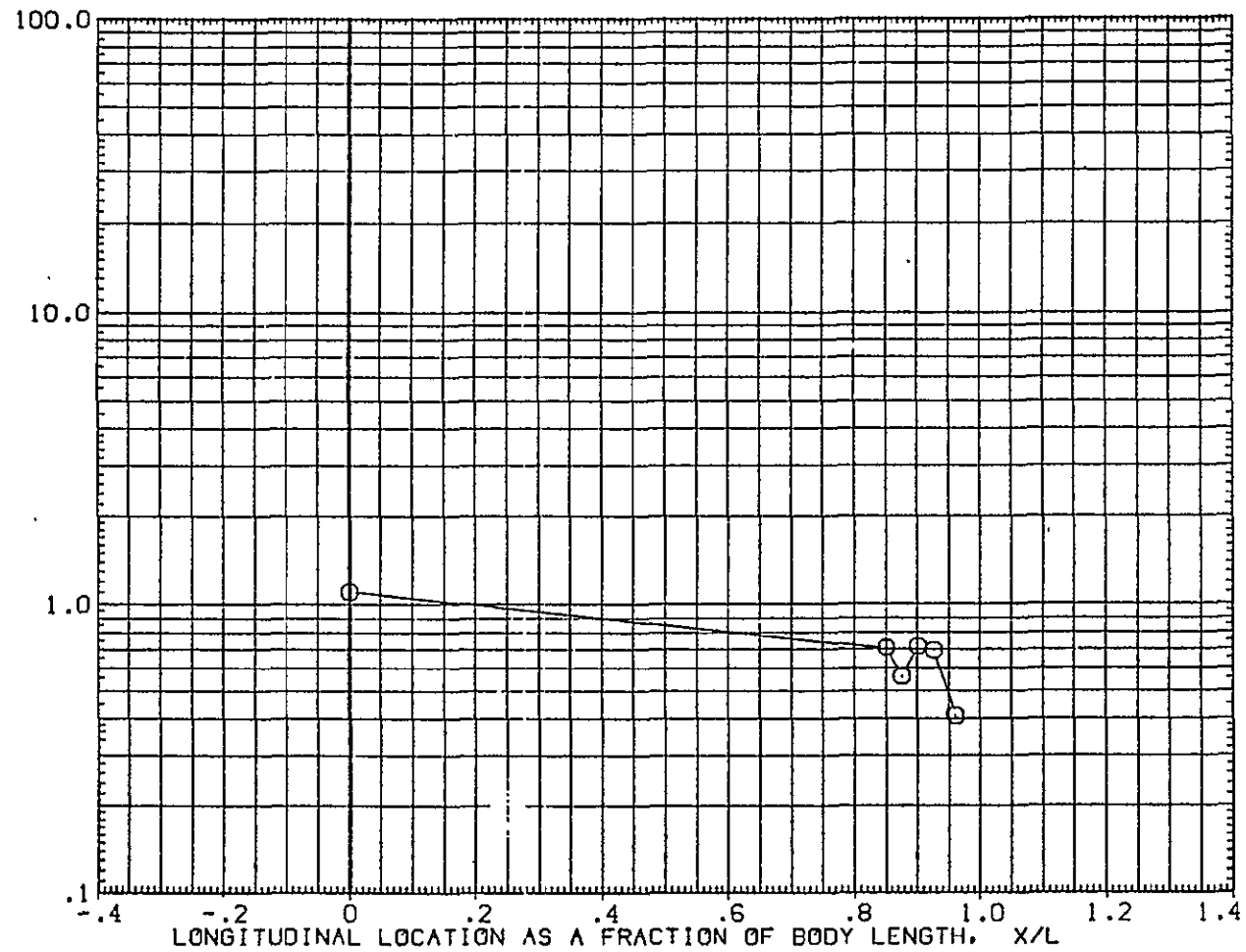


FIG. 6 EFFECT OF RECOVERY FACTOR ON E. TANK HEAT TRANSFER WITHOUT PROTUBERANCES

OH12 + IH21 MODEL 37 OT-NP(4)/T-NP(3) TANK (IUGTO4)

| | | | | | | |
|--------|--------|---------|--------|-------------------|------|-----------|
| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
| ○ | .900 | 247.000 | 18.200 | ALPHA | .000 | BETA .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU

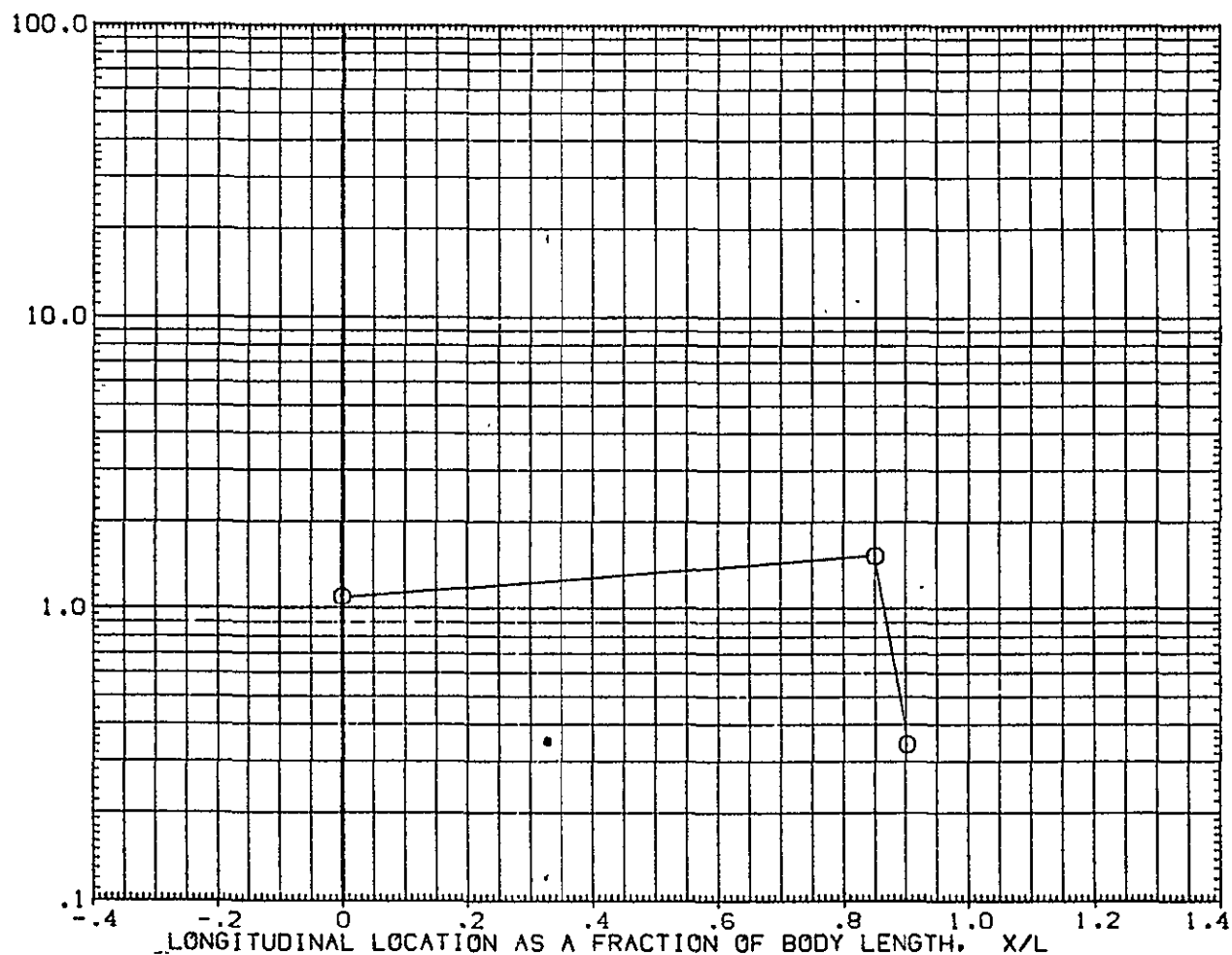


FIG. 6 EFFECT OF RECOVERY FACTOR ON E. TANK HEAT TRANSFER WITHOUT PROTUBERANCES

OH12 + 1H21 MODEL 37 OT-NP(4)/T-NP(3) TANK (IUGT04)

SYMBOL
O
HAW/HT
.900
PHI
270.000
MACH
18.200

PARAMETRIC VALUES
ALPHA
.000
BETA
.000

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, H_i/H_u

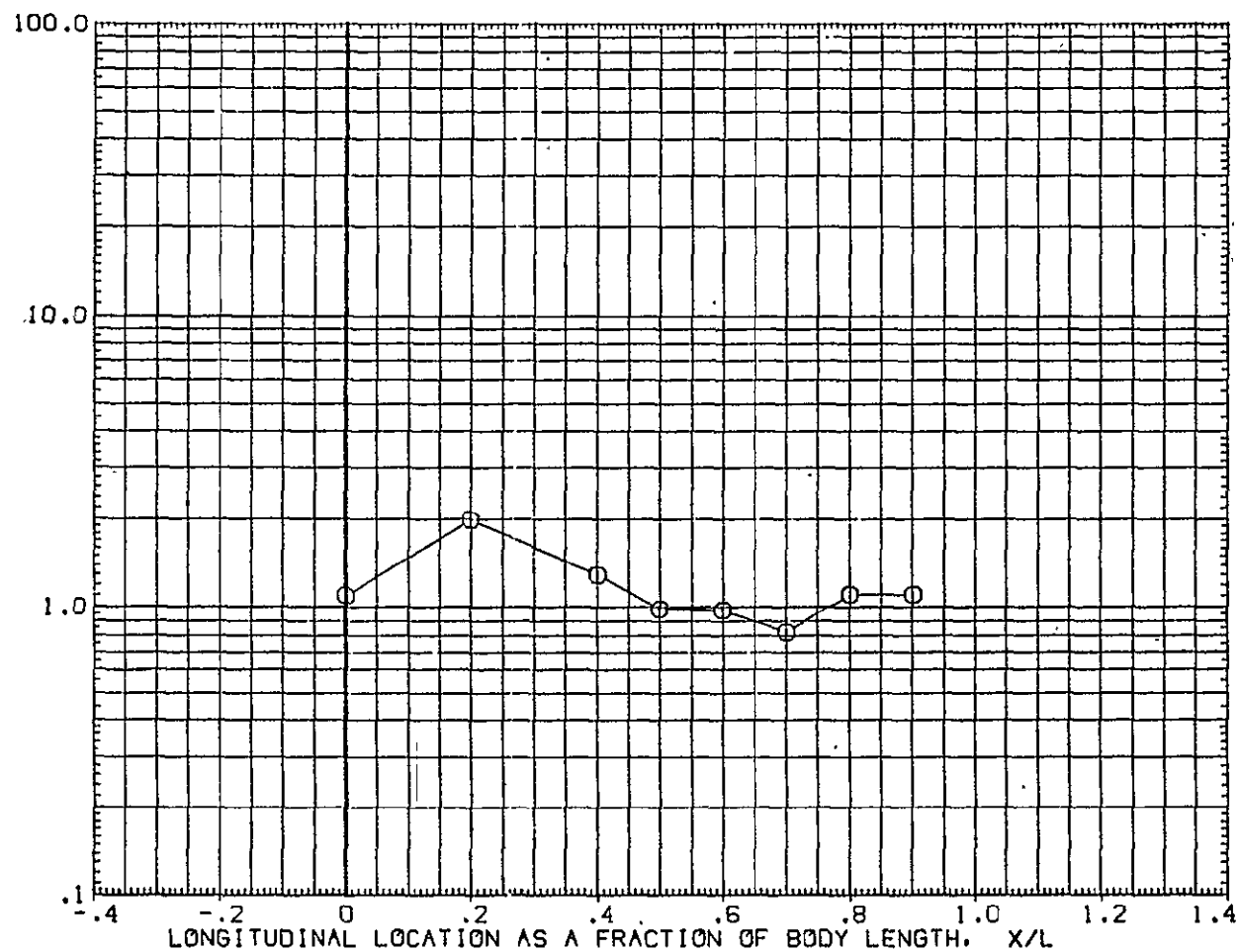


FIG. 6 EFFECT OF RECOVERY FACTOR ON E. TANK HEAT TRANSFER WITHOUT PROTUBERANCES

OH12 + IH21 MODEL 37 OT-NP(4)/T-NP(3) TANK (IUGT04)

| | | | | | | | |
|--------|--------|---------|--------|-------|-------------------|------|------|
| SYMBOL | HAW/HT | PHI | MACH | ALPHA | PARAMETRIC VALUES | BETA | |
| O | .900 | 315.000 | 18.200 | | .000 | | .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU

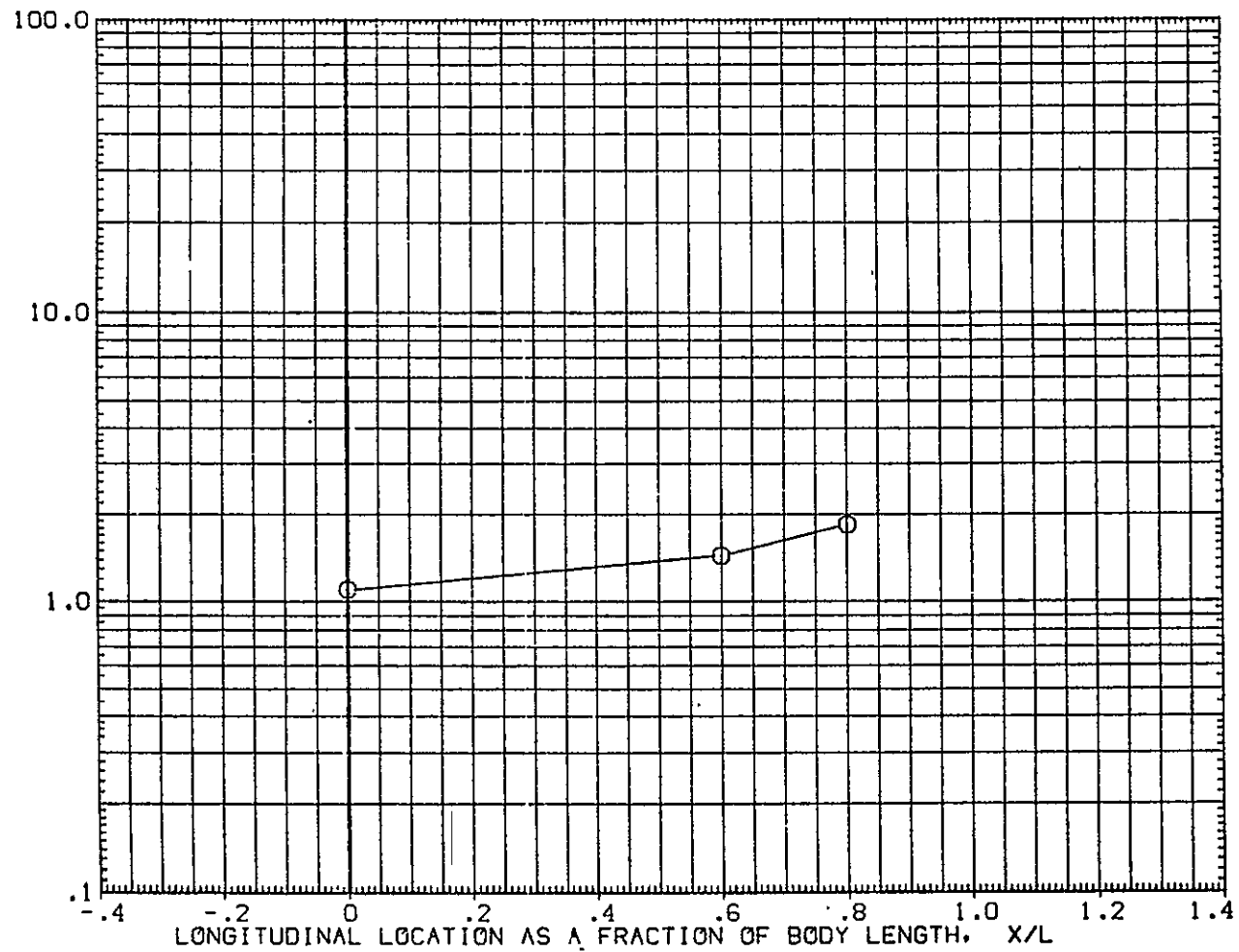


FIG. 6 EFFECT OF RECOVERY FACTOR ON E. TANK HEAT TRANSFER WITHOUT PROTUBERANCES

| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ALPHA | BETA |
|-----------------|--|-------|------|
| (RUGT01) | OH12/1H21 (CAL HST 173-100) 37 T TANK | .000 | .000 |
| (RUGT03) | OH12/1H21 (CAL HST 173-100) 37 T-NP TANK | .000 | .000 |

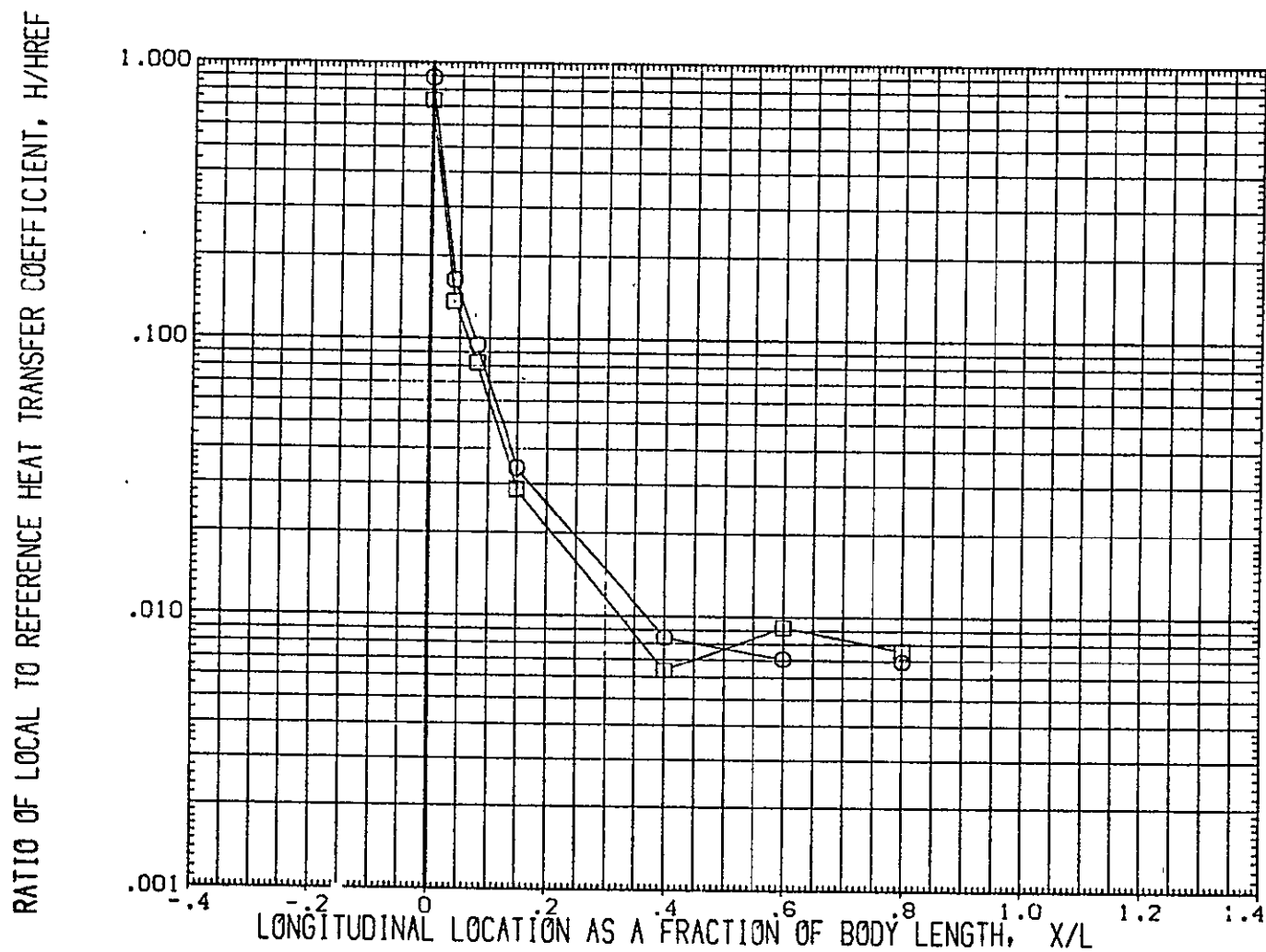


FIG. 7 EFFECT OF PROTUBERANCES ON THE EXTERNAL TANK HEAT TRANSFER ALPHA = 0
MACH = 18.400 HAW/HT = .850 PHI = .000

| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ALPHA | BETA |
|-----------------|---|-------|------|
| (RUGT01) | ØH12/H21 (CAL HST 173-100) 37 T TANK | .000 | .000 |
| (RUGT03) | ØH12/H21 (CAL HST 173-100) 37 T-NP TANK | .000 | .000 |

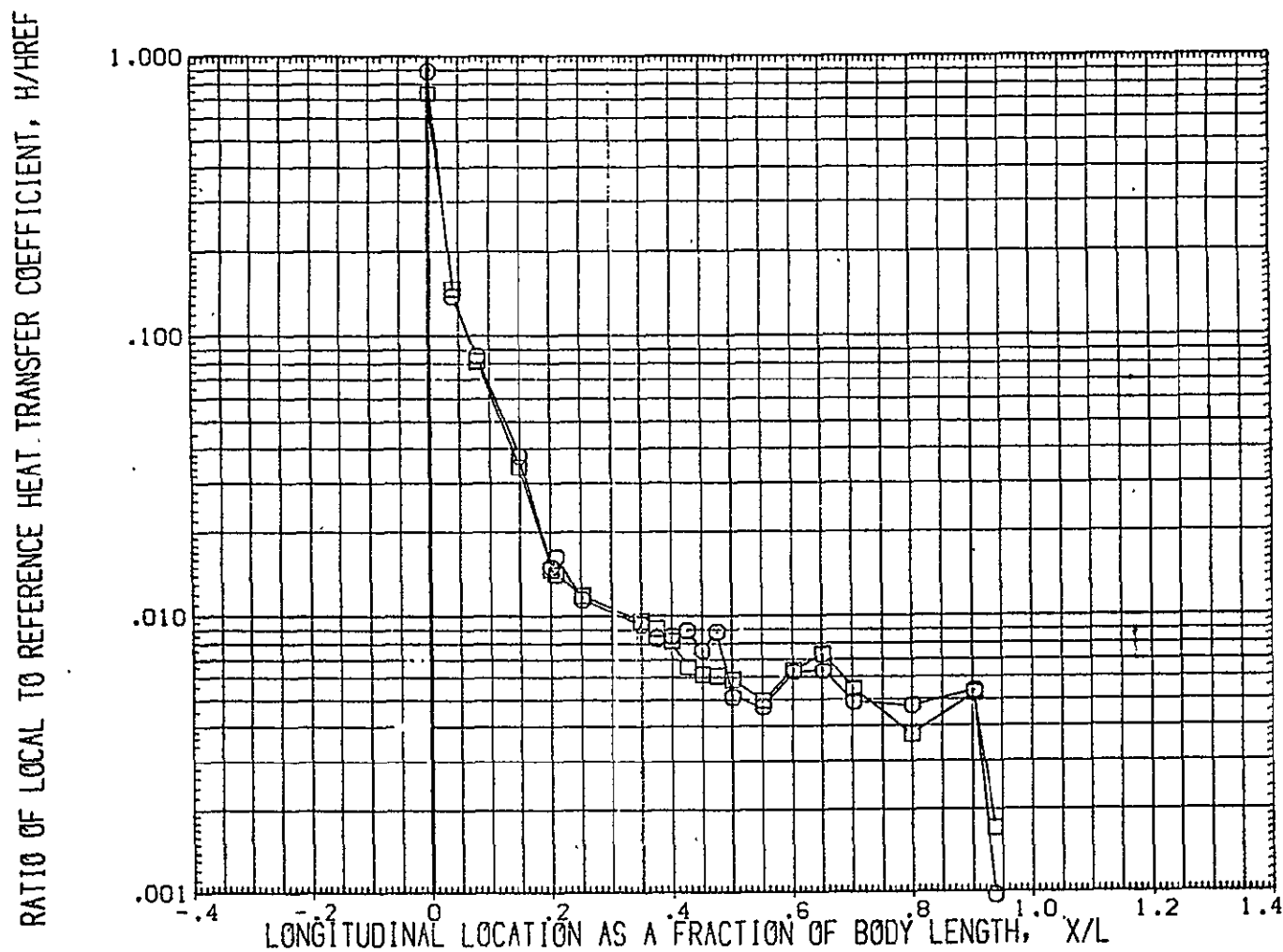


FIG. 7 EFFECT OF PROTUBERANCES ON THE EXTERNAL TANK HEAT TRANSFER ALPHA = 0
MACH = 18.400 HAW/HT = .850 PHI = 180.000 PAGE 154

| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ALPHA | BETA |
|-----------------|--|-------|------|
| (RUGT01) | 0412/1H21 (CAL HST 173-100) 37 T TANK | .000 | .000 |
| (RUGT03) | 0412/1H21 (CAL HST 173-100) 37 T-NP TANK | .000 | .000 |

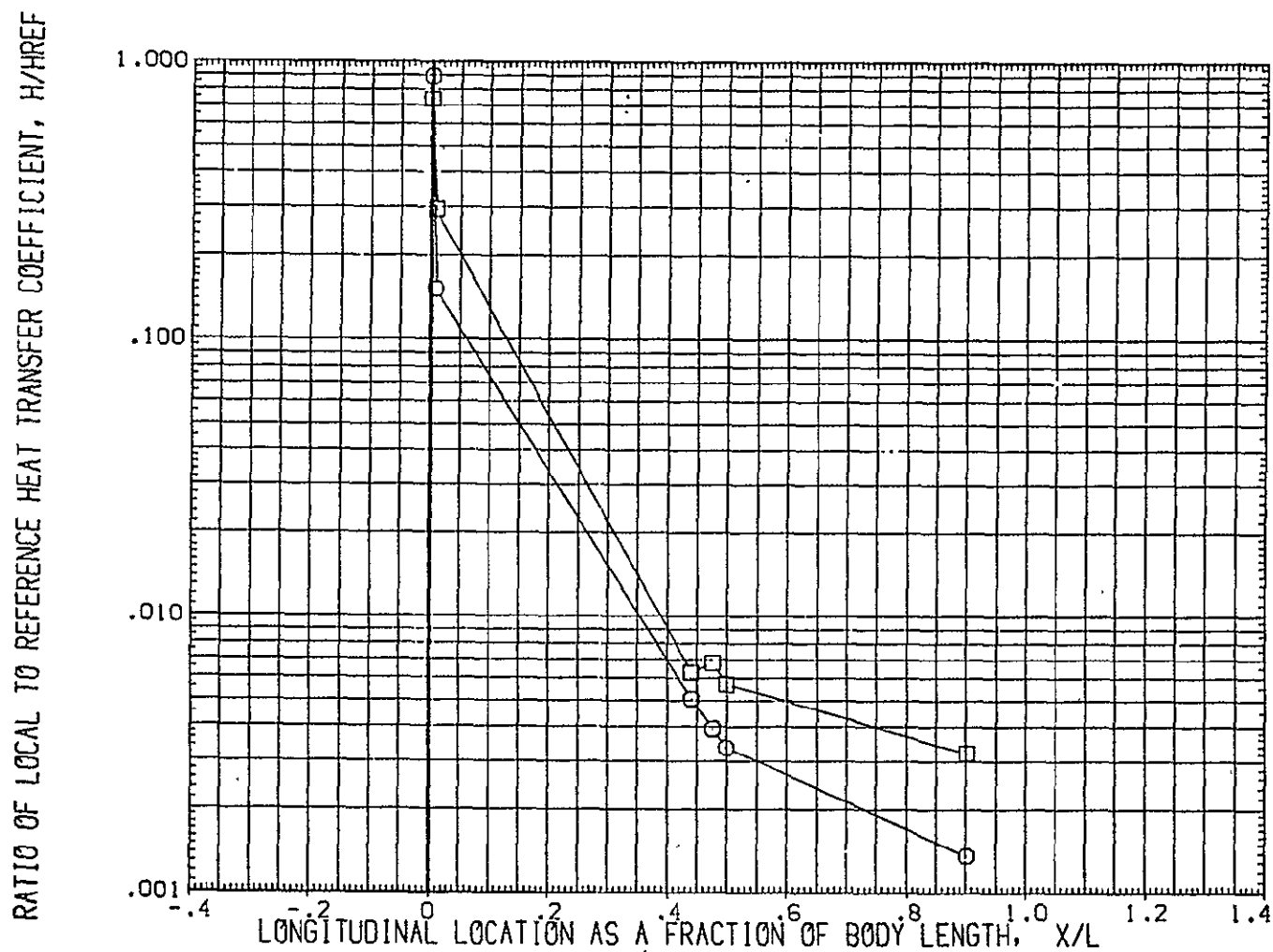


FIG. 7 EFFECT OF PROTUBERANCES ON THE EXTERNAL TANK HEAT TRANSFER ALPHA = 0
MACH = 18.400 HAW/HT = .850 PHI = 199.000 PAGE 155

| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ALPHA | BETA |
|-----------------|--|-------|------|
| (RUGT01) | OH12/IH21 (CAL HST 173-100) 37 T TANK | .000 | .000 |
| (RUGT03) | OH12/IH21 (CAL HST 173-100) 37 T-NP TANK | .000 | .000 |

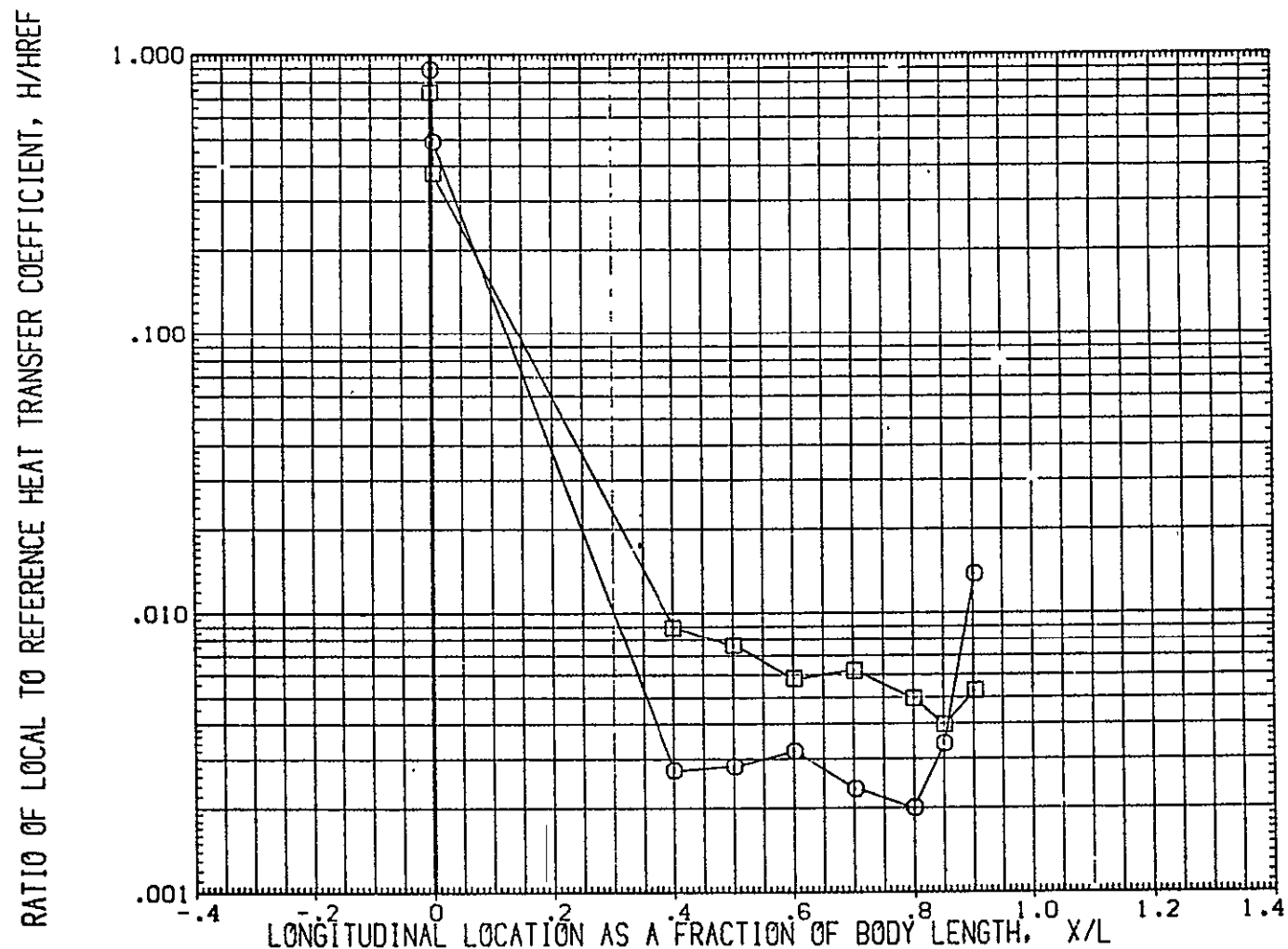
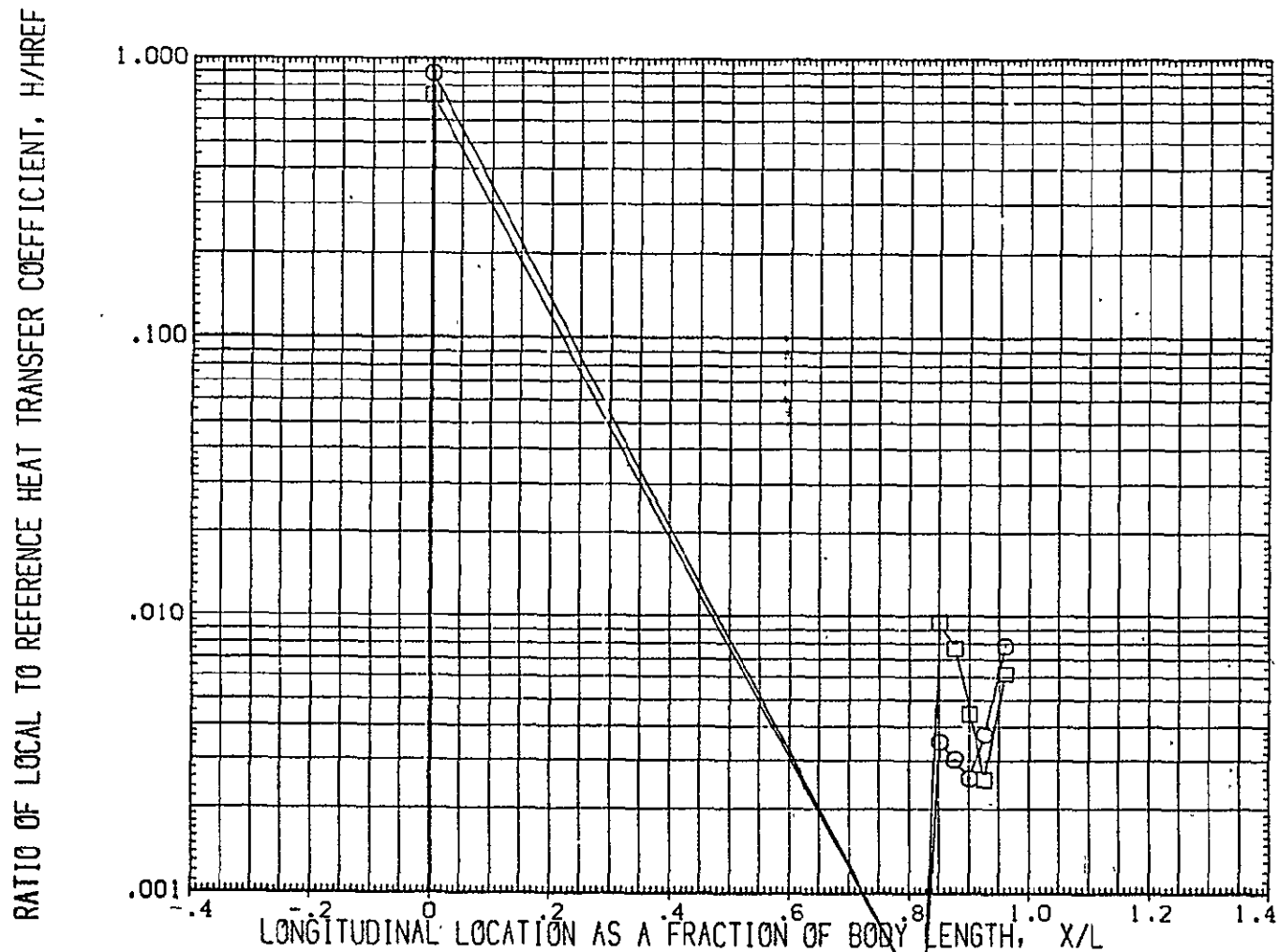


FIG. 7 EFFECT OF PROTUBERANCES ON THE EXTERNAL TANK HEAT TRANSFER ALPHA = 0

MACH = 18.400 HAW/HT = .850 PHI = 221.000

| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ALPHA | BETA |
|-----------------|--|-------|------|
| (RUGT01) | CH12/1H21 (CAL HST 173-100) 37 T TANK | .000 | .000 |
| (RUGT03) | CH12/1H21 (CAL HST 173-100) 37 T-NP TANK | .000 | .000 |



MACH = 18.400 HAW/HT = .850 PHI = 241.000

PAGE 157

| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ALPHA | BETA |
|-----------------|--|-------|------|
| (RUGT01) | OH12/1H21 (CAL HST 173-100) 37 T TANK | .000 | .000 |
| (RUGT03) | OH12/1H21 (CAL HST 173-100) 37 T-NP TANK | .000 | .000 |

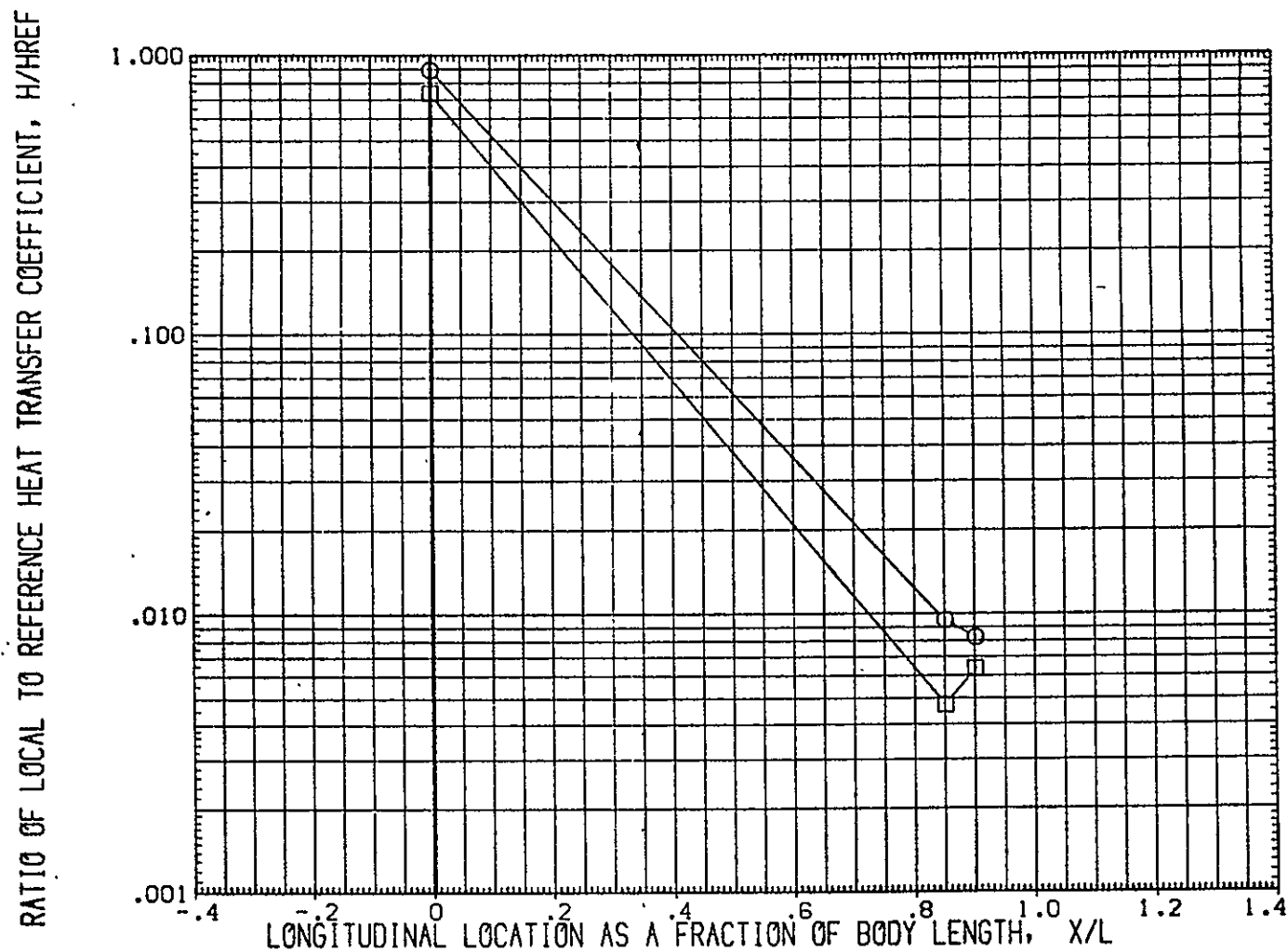


FIG. 7 EFFECT OF PROTUBERANCES ON THE EXTERNAL TANK HEAT TRANSFER ALPHA = 0
MACH = 18.400 HAW/HT = .850 PHI = 247.000 PAGE 158

REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR

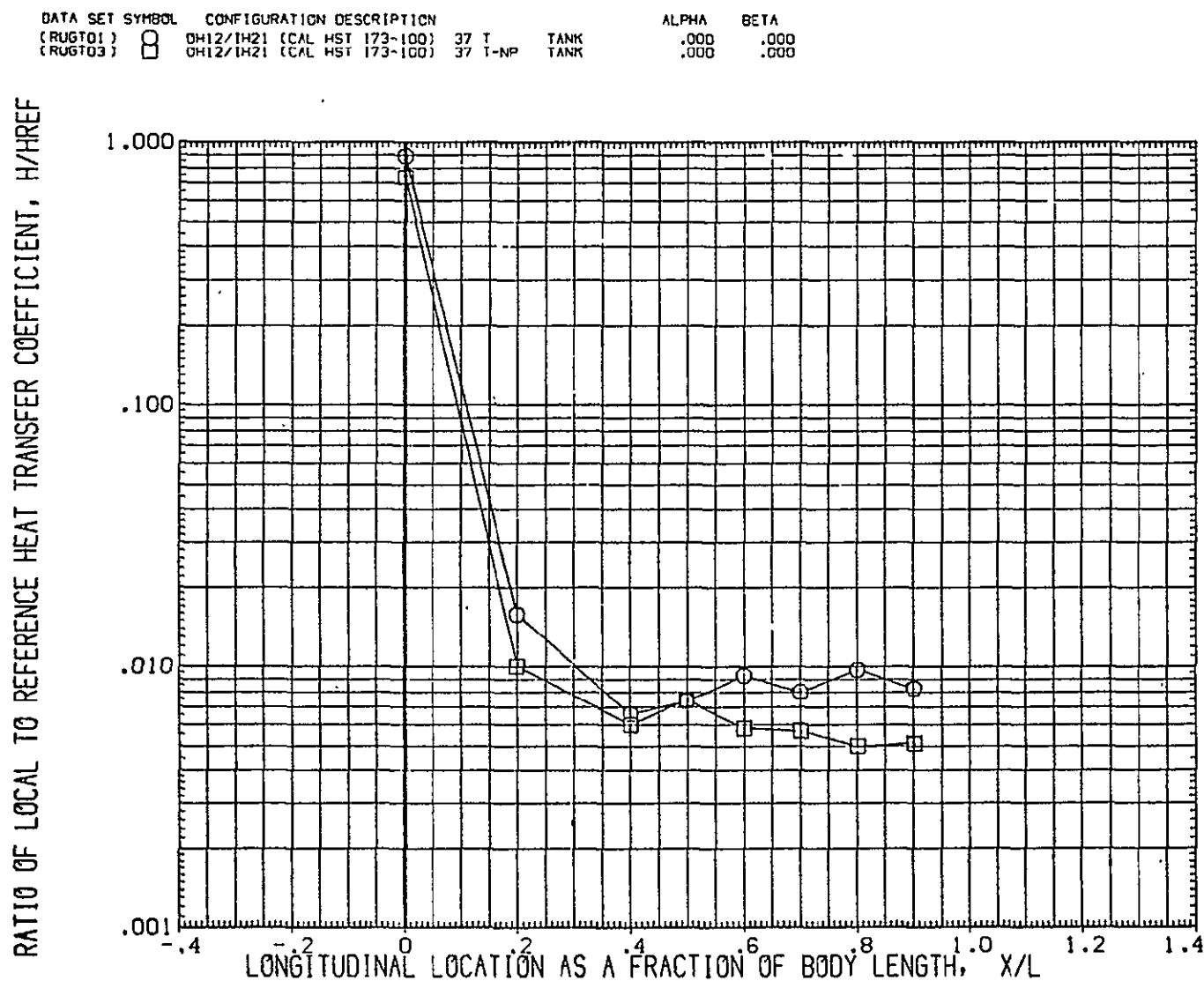


FIG. 7 EFFECT OF PROTUBERANCES ON THE EXTERNAL TANK HEAT TRANSFER · ALPHA = 0
MACH = 18.400 HAW/HT = .850 PHI = 270.000 PAGE 159

| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ALPHA | BETA |
|-----------------|--|-------|------|
| (RUGT01) | OH12/1H21 (CAL HST 173-100) 37 T TANK | .000 | .000 |
| (RUGT03) | OH12/1H21 (CAL HST 173-100) 37 T-NP TANK | .000 | .000 |

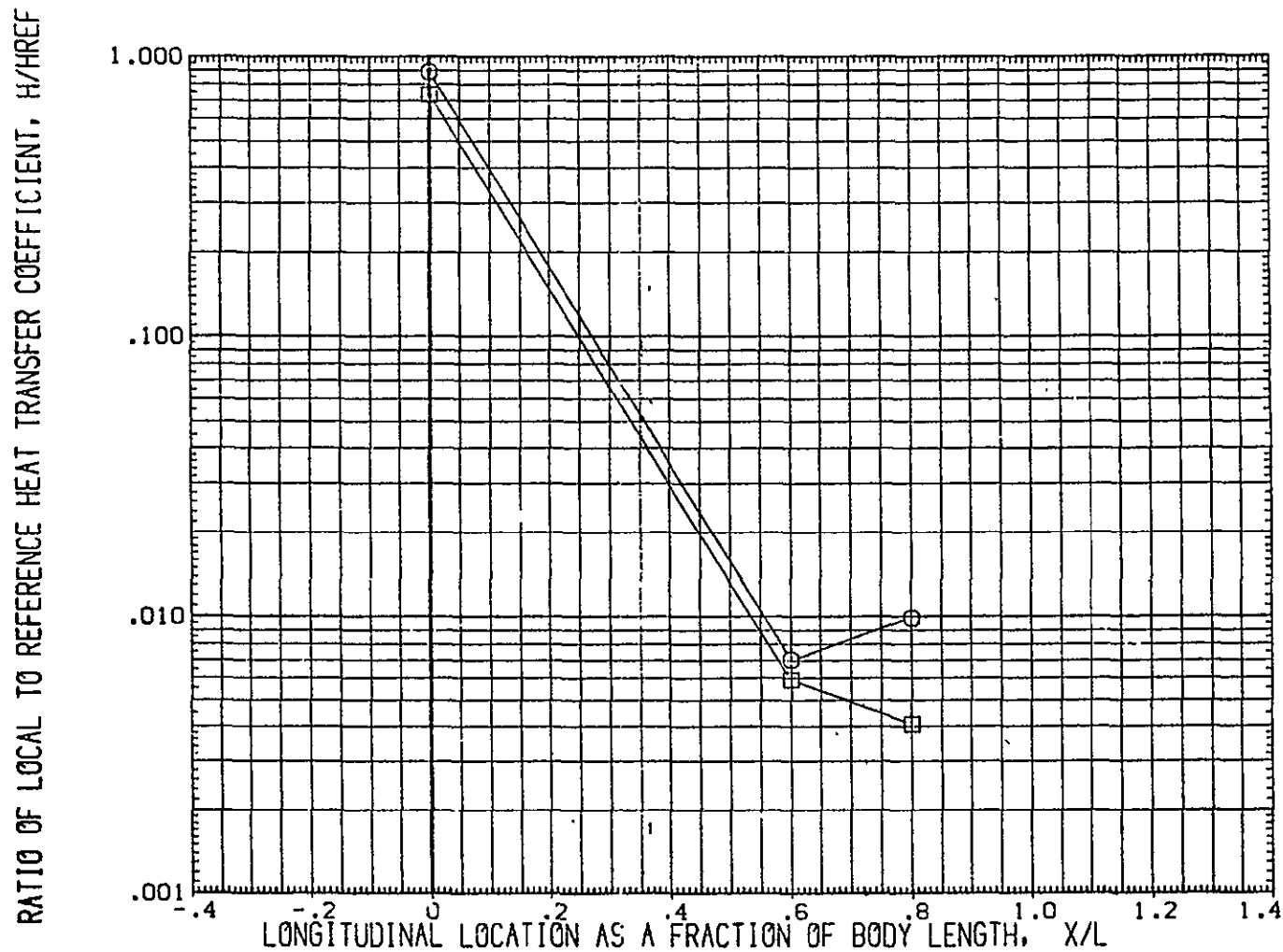


FIG. 7 EFFECT OF PROTUBERANCES ON THE EXTERNAL TANK HEAT TRANSFER ALPHA = 0

MACH = 18.400 HAW/HT= .850 PHI = 315.000

PAGE 160

| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ALPHA | BETA |
|-----------------|--|-------|------|
| (RUGT01) | CH12/1H21 (CAL HST 173-100) 37 T TANK | .000 | .000 |
| (RUGT03) | CH12/1H21 (CAL HST 173-100) 37 T-NP TANK | .000 | .000 |

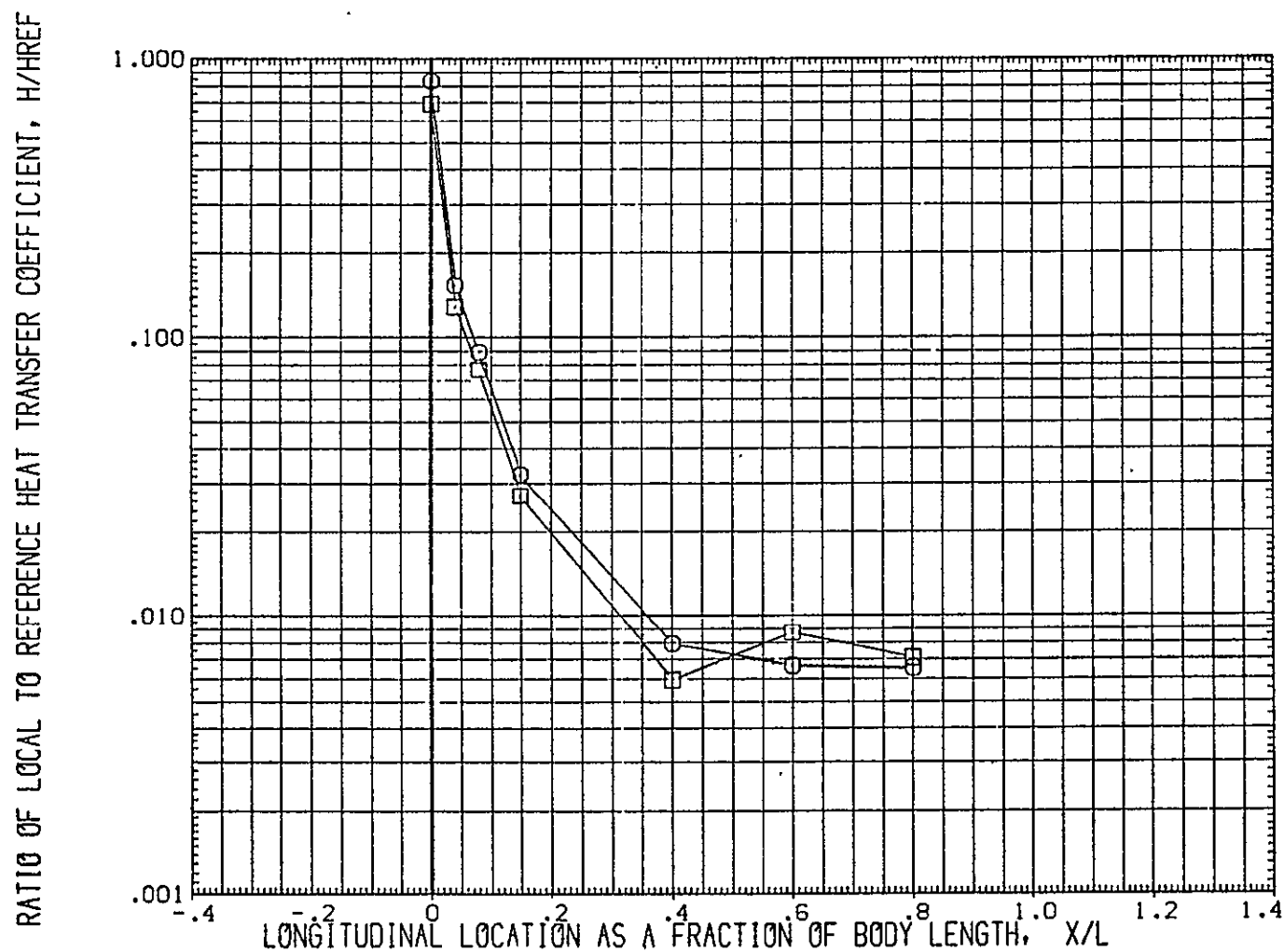


FIG. 7 EFFECT OF PROTUBERANCES ON THE EXTERNAL TANK HEAT TRANSFER $\alpha = 0$

MACH = 18.400 HAW/HT = .900 PHI = .000

PAGE 161

| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ALPHA | BETA |
|-----------------|--|-------|------|
| (RUGT01) | OH12/1H21 (CAL HST 173-100) 37 T TANK | .000 | .000 |
| (RUGT03) | OH12/1H21 (CAL HST 173-100) 37 T-NP TANK | .000 | .000 |

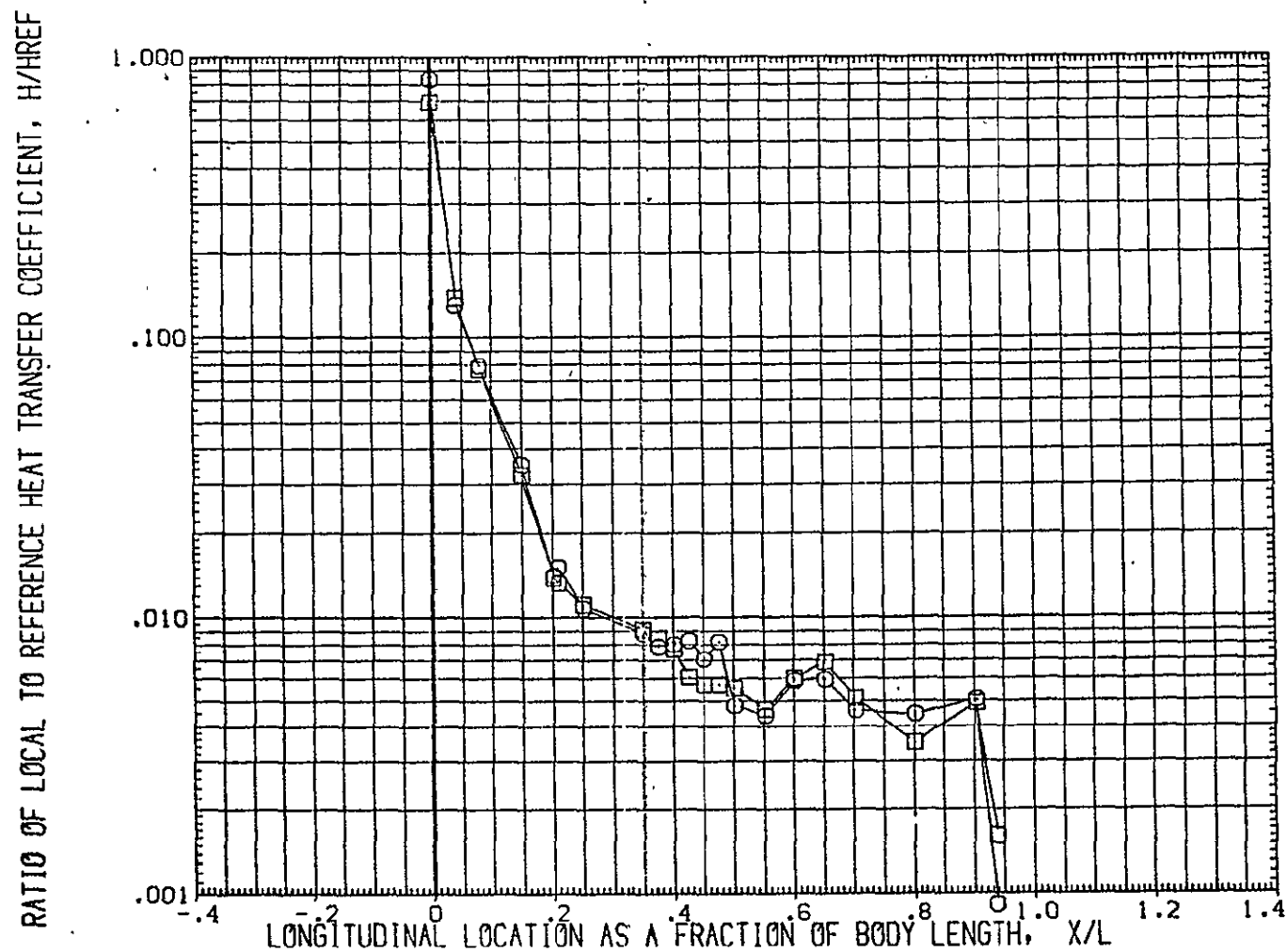


FIG. 7 EFFECT OF PROTUBERANCES ON THE EXTERNAL TANK HEAT TRANSFER ALPHA = 0

MACH = 18.400 HAW/HT = .900 PHI = 180.000

PAGE 162

| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ALPHA | BETA |
|-----------------|--|-------|------|
| (RUGT01) | CH12/1H21 (CAL HST 173-100) 37 T TANK | .000 | .000 |
| (RUGT03) | CH12/1H21 (CAL HST 173-100) 37 T-NP TANK | .000 | .000 |

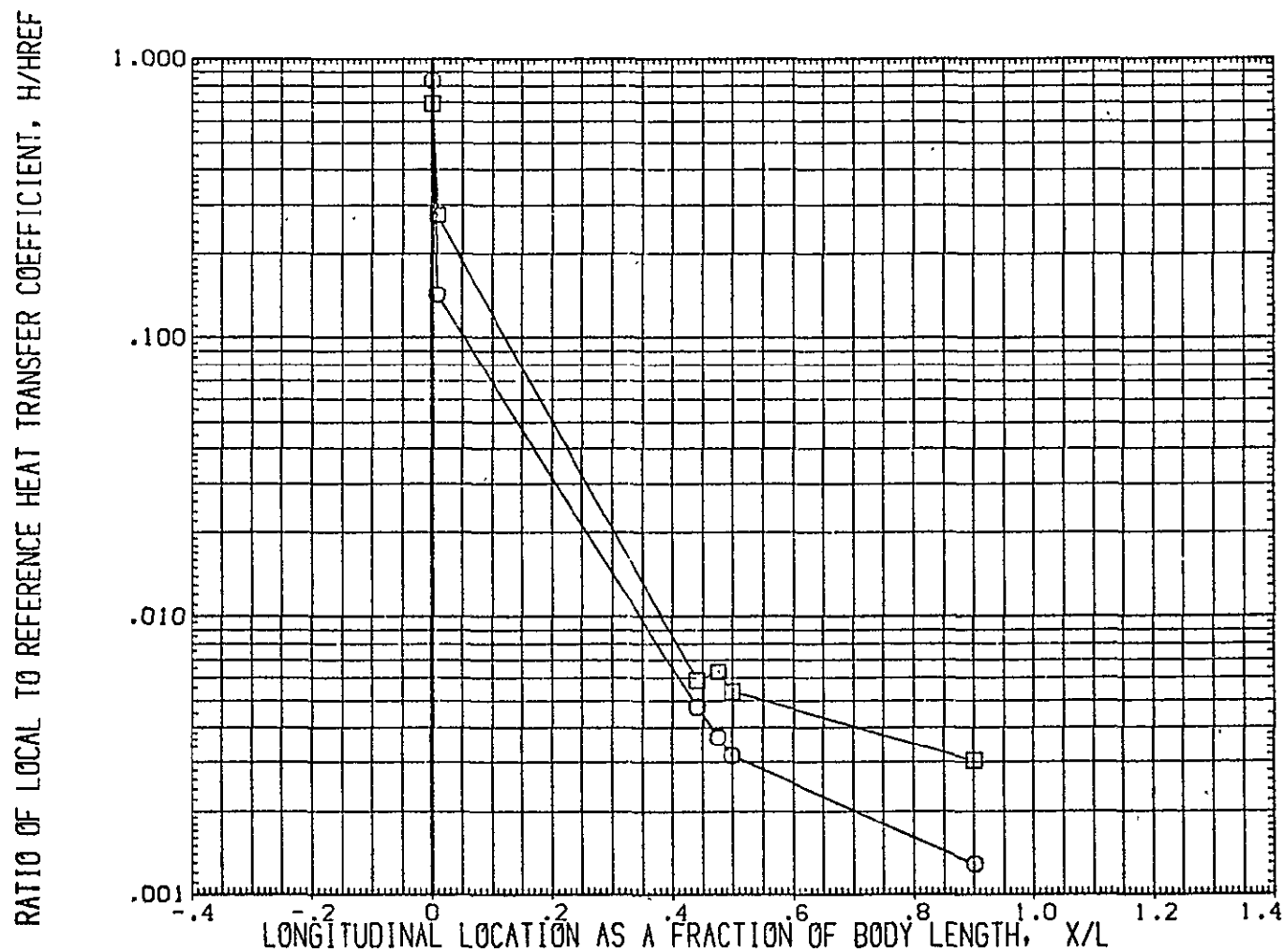


FIG. 7 EFFECT OF PROTUBERANCES ON THE EXTERNAL TANK HEAT TRANSFER ALPHA = 0

MACH = 18.400 HAW/HT = .900 PHI = 199.000

PAGE 163

| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ALPHA | BETA |
|-----------------|--|-------|------|
| (RUGT01) | OH12/1H21 (CAL HST 173-100) 37 T TANK | .000 | .000 |
| (RUGT03) | OH12/1H21 (CAL HST 173-100) 37 T-NP TANK | .000 | .000 |

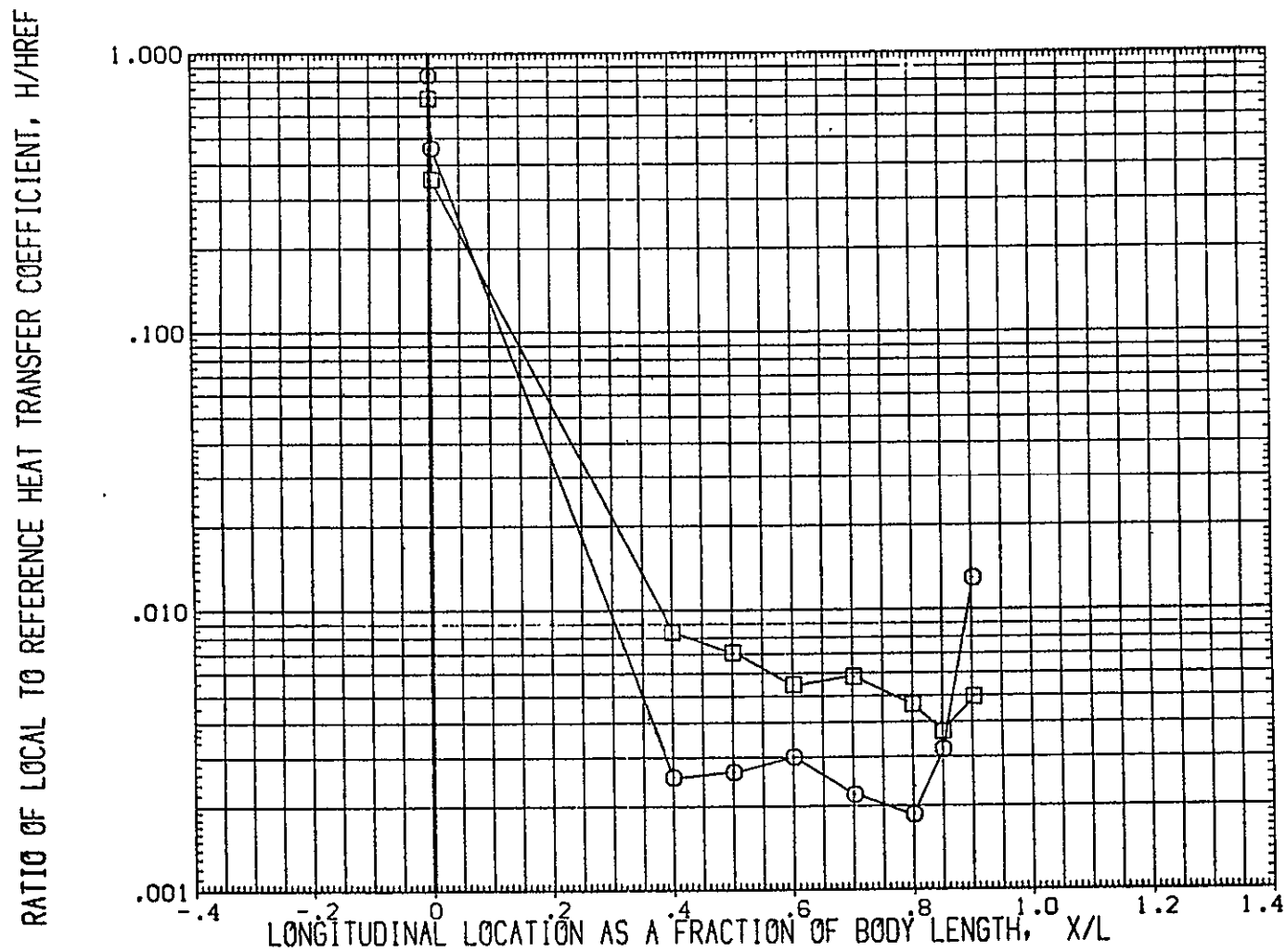


FIG. 7 EFFECT OF PROTUBERANCES ON THE EXTERNAL TANK HEAT TRANSFER ALPHA = 0

MACH = 18.400 HAW/HT = .900 PHI = 221.000

PAGE 164

| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ALPHA | BETA |
|-----------------|--|-------|------|
| (RUGT01) | 0H12/1H21 (CAL HST 173-100) 37 T TANK | .000 | .000 |
| (RUGT03) | 0H12/1H21 (CAL HST 173-100) 37 T-NP TANK | .000 | .000 |

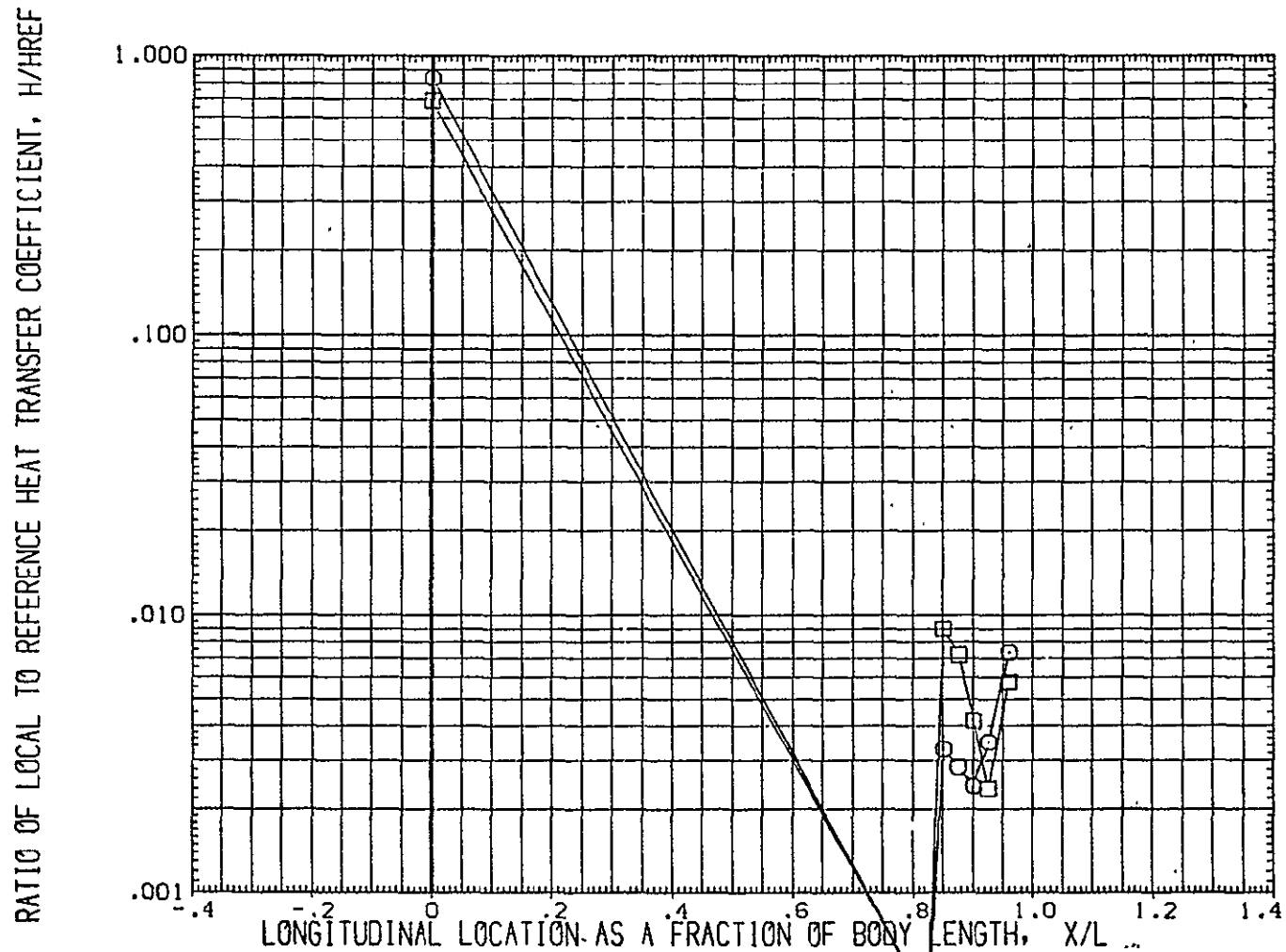


FIG. 7 EFFECT OF PROTUBERANCES ON THE EXTERNAL TANK HEAT TRANSFER ALPHA = 0

MACH = 18.400 HAW/HT = .900 PHI = 241.000

PAGE 165

| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ALPHA | BETA |
|-----------------|--|-------|------|
| (RUGT01) | CH12/IH21 (CAL HST 173-100) 37 T TANK | .000 | .000 |
| (RUGT03) | CH12/IH21 (CAL HST 173-100) 37 T-NP TANK | .000 | .000 |

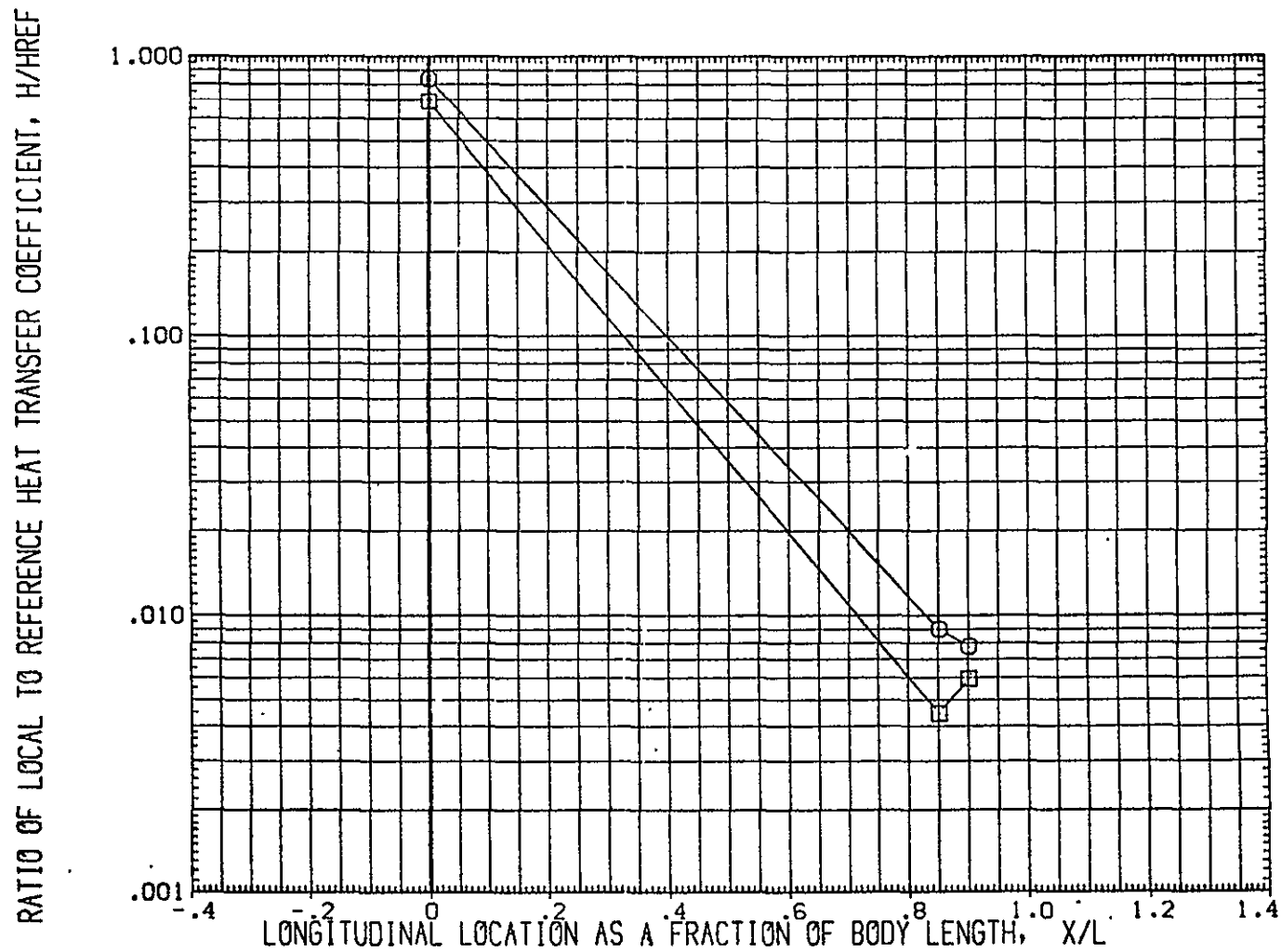


FIG. 7 EFFECT OF PROTUBERANCES ON THE EXTERNAL TANK HEAT TRANSFER ALPHA = 0
MACH = 18.400 HAW/HT = .900 PHI = 247.000 PAGE 166

REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR

| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ALPHA | BETA |
|-----------------|--|-------|------|
| (RUGT01) | OH12/1H21 (CAL HST 173-100) 37 T TANK | .000 | .000 |
| (RUGT03) | OH12/1H21 (CAL HST 173-100) 37 T-NP TANK | .000 | .000 |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

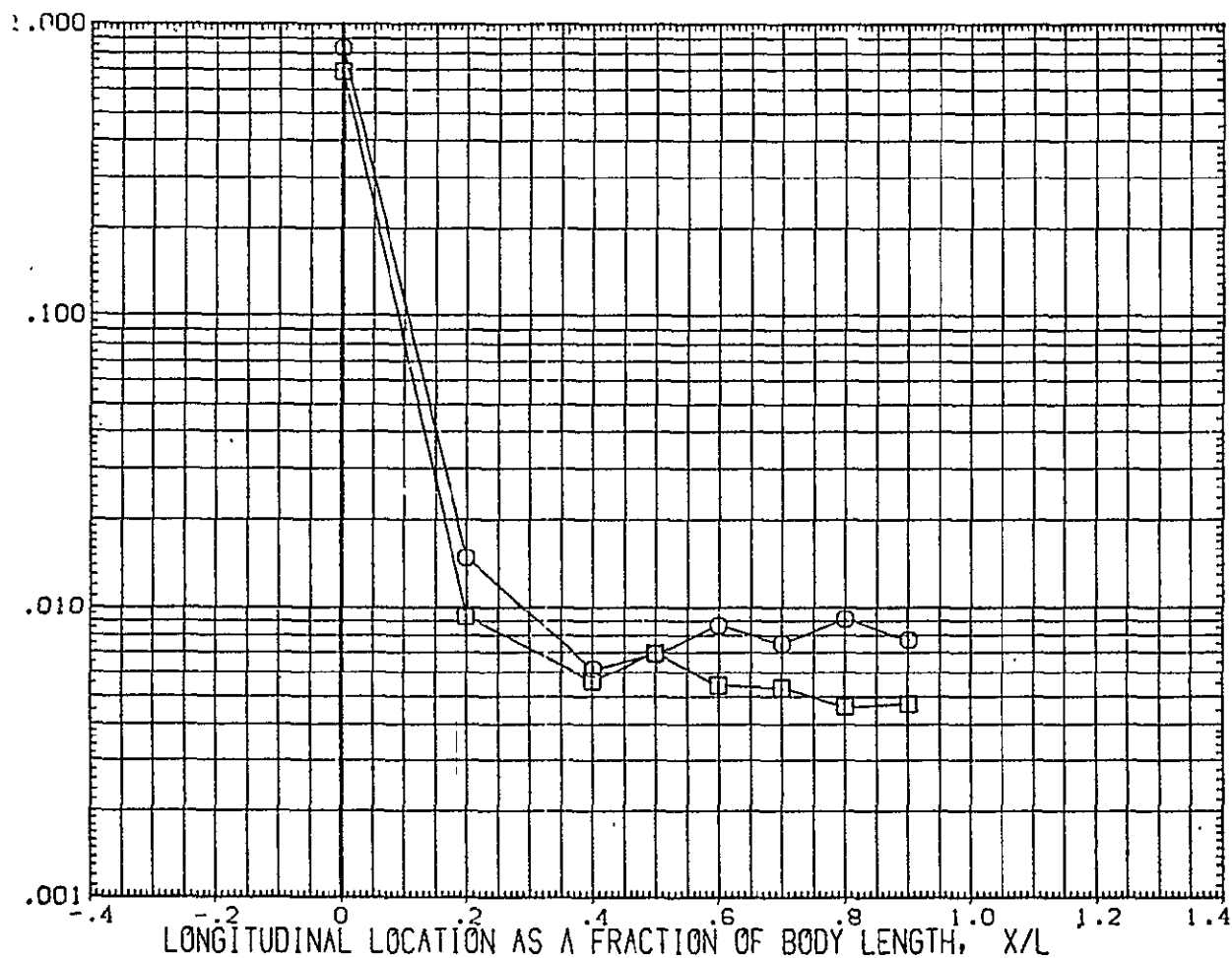


FIG. 7 EFFECT OF PROTUBERANCES ON THE EXTERNAL TANK HEAT TRANSFER: ALPHA = 0

MACH = 18.400 HAW/HT = .900 PHI = 270.000

PAGE 167

| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ALPHA | BETA |
|-----------------|--|-------|------|
| (RUGT01) | OH12/1H21 (CAL HST 173-100) 37 T TANK | .000 | .000 |
| (RUGT03) | OH12/1H21 (CAL HST 173-100) 37 T-NP TANK | .000 | .000 |

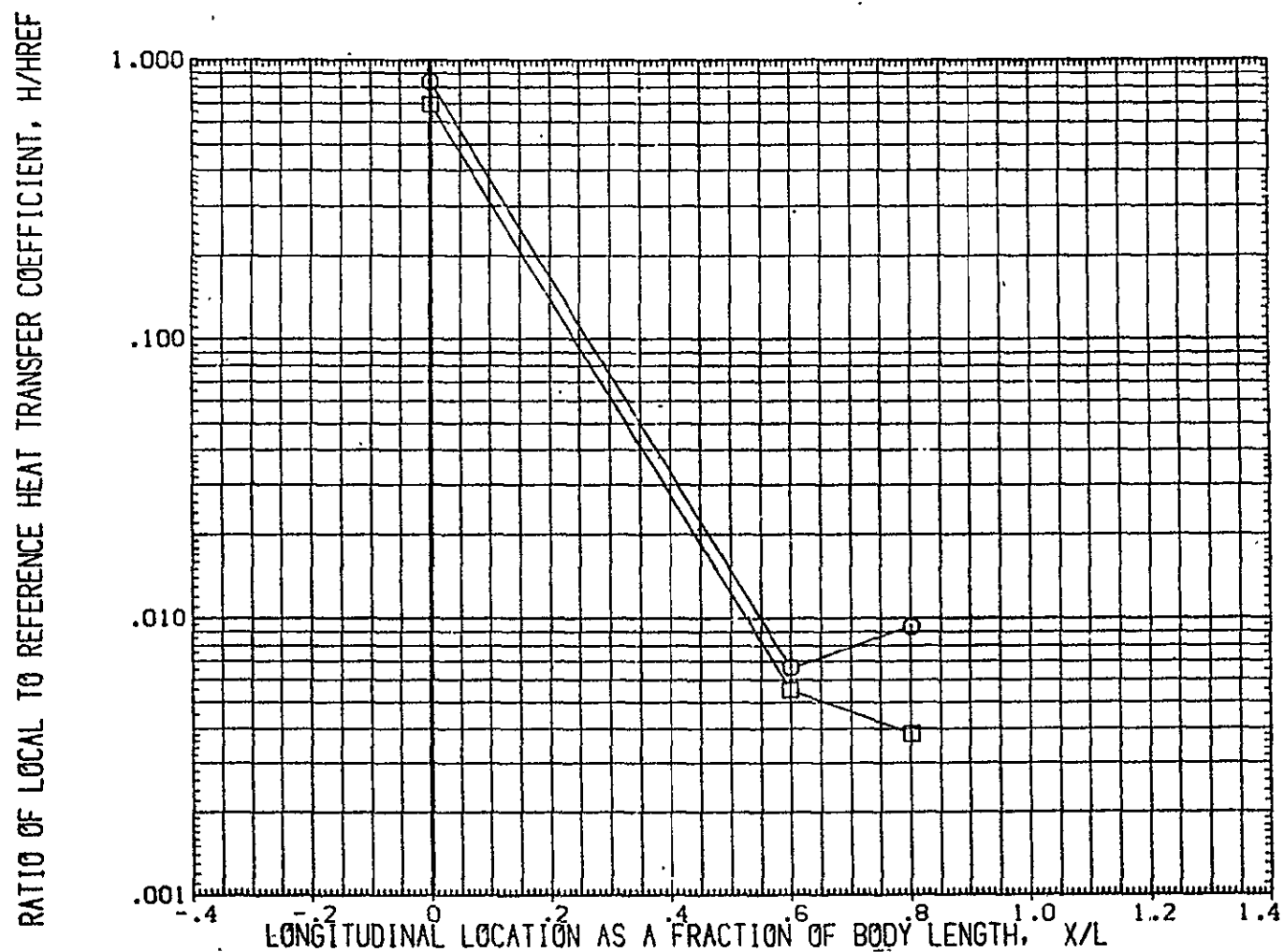


FIG. 7 EFFECT OF PROTUBERANCES ON THE EXTERNAL TANK HEAT TRANSFER $\alpha = 0$
MACH = 18.400 HAW/HT = .900 PHI = 315.000 PAGE 168

| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ALPHA | BETA |
|-----------------|--|-------|------|
| (RUGT01) | OH12/1H21 (CAL HST 173-100) 37 T TANK | .000 | .000 |
| (RUGT03) | OH12/1H21 (CAL HST 173-100) 37 T-NP TANK | .000 | .000 |

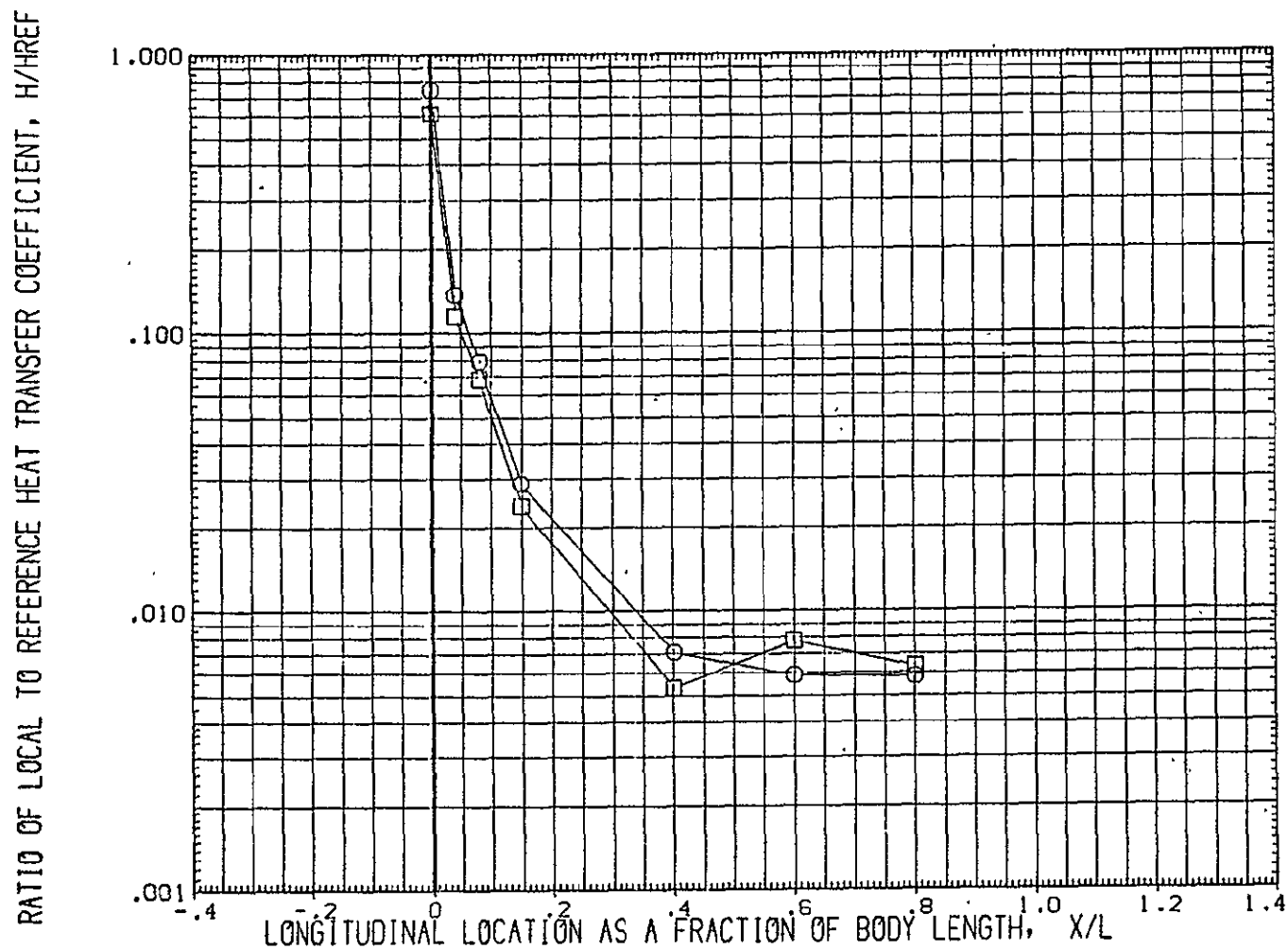


FIG. 7 EFFECT OF PROTUBERANCES ON THE EXTERNAL TANK HEAT TRANSFER $\alpha = 0$
MACH = 18.400 HAW/HT = 1.000 PHI = .000 PAGE 169

| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ALPHA | BETA |
|-----------------|--|-------|------|
| (RUGT01) | OH12/1H21 (CAL HST 173-100) 37 T TANK | .000 | .000 |
| (RUGT03) | OH12/1H21 (CAL HST 173-100) 37 T-NP TANK | .000 | .000 |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, h/h_{REF}

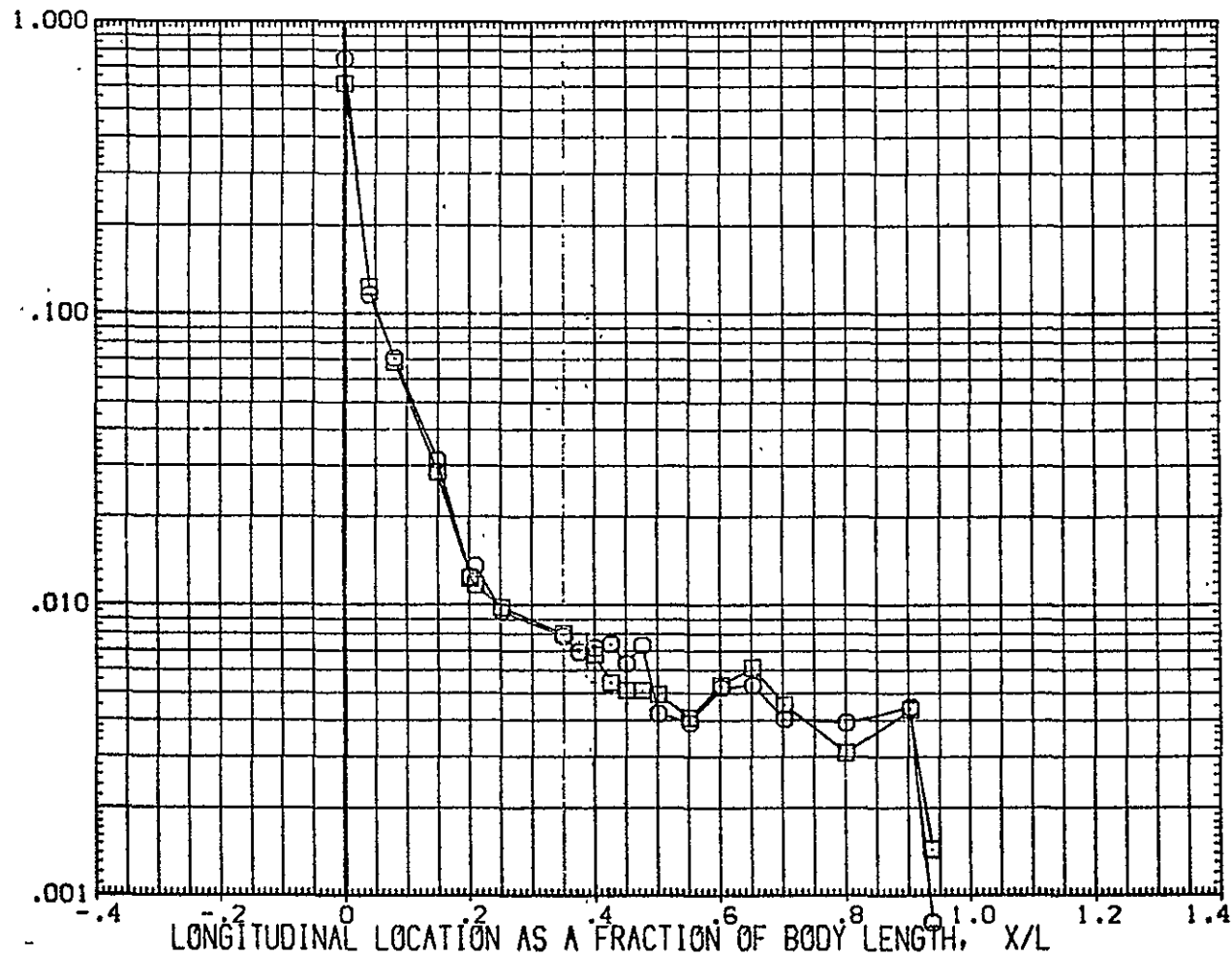


FIG. 7 EFFECT OF PROTUBERANCES ON THE EXTERNAL TANK HEAT TRANSFER ALPHA = 0

MACH = 18.400 HAW/HT= 1.000 PHI = 180.000

PAGE 170

| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ALPHA | BETA |
|-----------------|--|-------|------|
| (RUGT01) | OH12/1H21 (CAL HST 173-100) 37 T TANK | .000 | .000 |
| (RUGT03) | OH12/1H21 (CAL HST 173-100) 37 T-NP TANK | .000 | .000 |

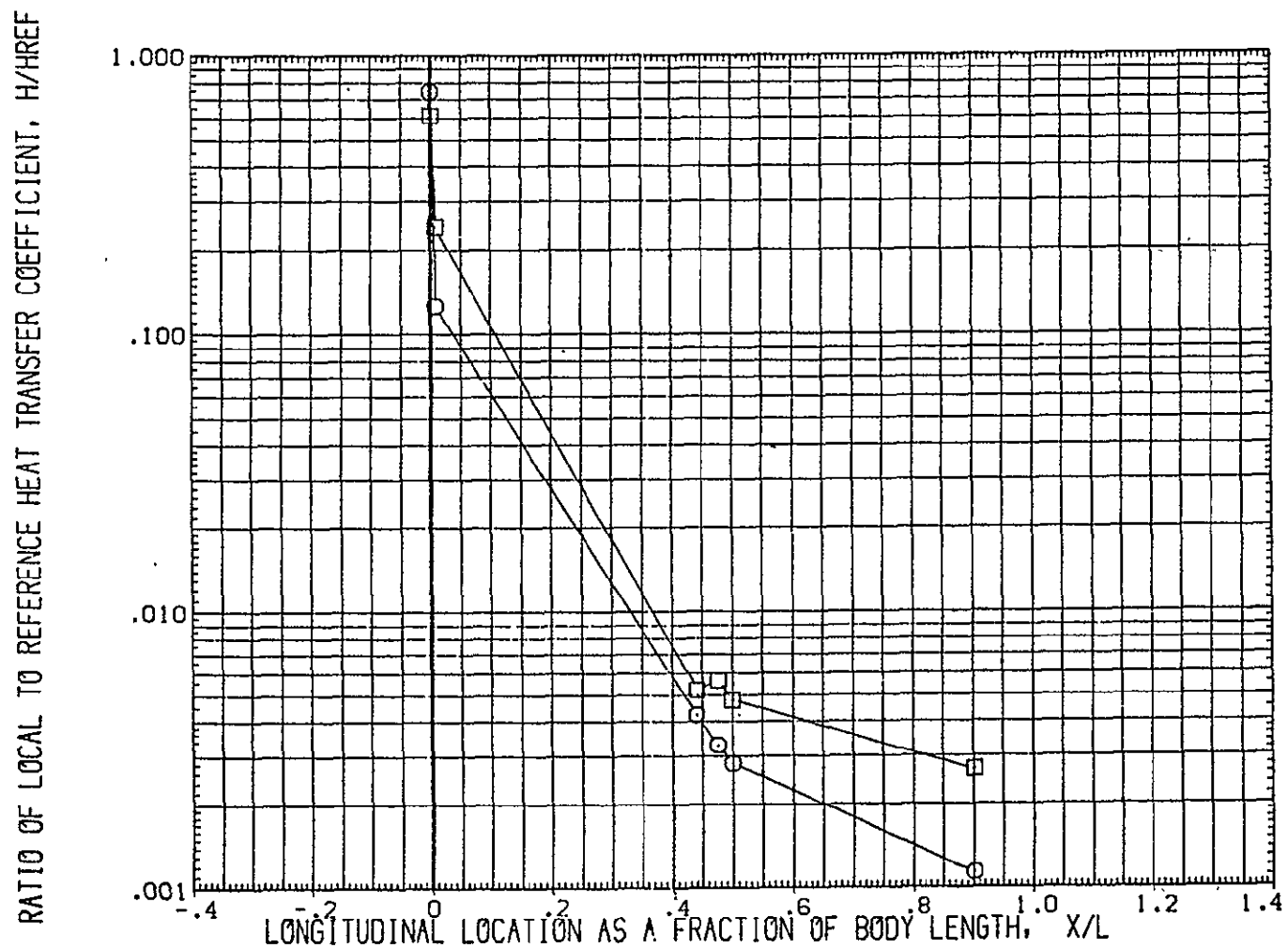


FIG. 7 EFFECT OF PROTUBERANCES ON THE EXTERNAL TANK HEAT TRANSFER ALPHA = 0
MACH = 18.400 HAW/HT = 1.000 PHI = 199.000 PAGE 171

| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ALPHA | BETA |
|-----------------|--|-------|------|
| (RUGT01) | CH12/1H21 (CAL HST 173-100) 37 T TANK | .000 | .000 |
| (RUGT03) | CH12/1H21 (CAL HST 173-100) 37 T-NP TANK | .000 | .000 |

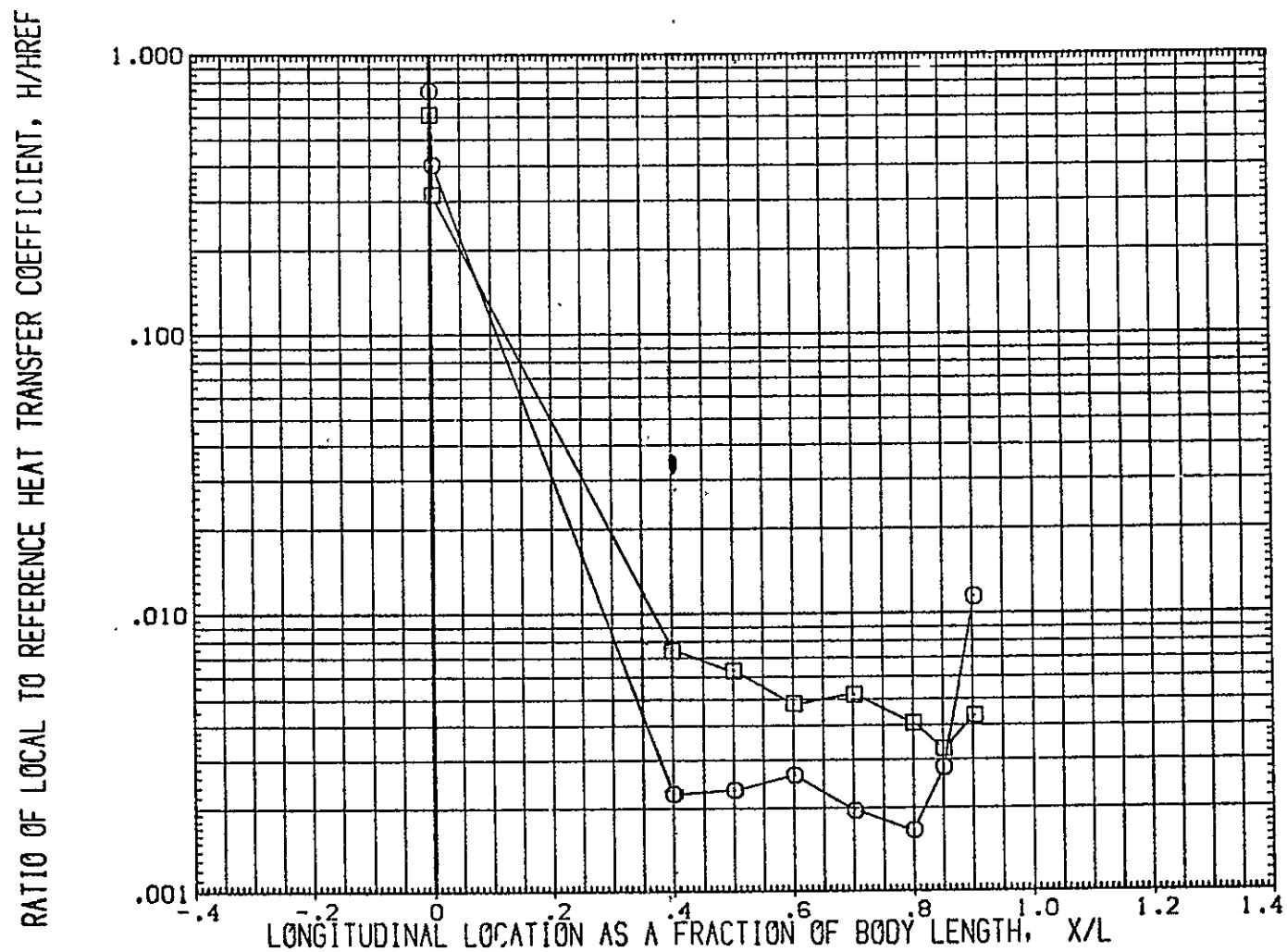


FIG. 7 EFFECT OF PROTUBERANCES ON THE EXTERNAL TANK HEAT TRANSFER ALPHA = 0
MACH = 18.400 HAW/HT = 1.000 PHI = 221.000 PAGE 172

| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ALPHA | BETA |
|-----------------|--|-------|------|
| (RUGT01) | OH12/1H21 (CAL HST [73-100] 37 T TANK | .000 | .000 |
| (RUGT03) | OH12/1H21 (CAL HST [73-100] 37 T-NP TANK | .000 | .000 |

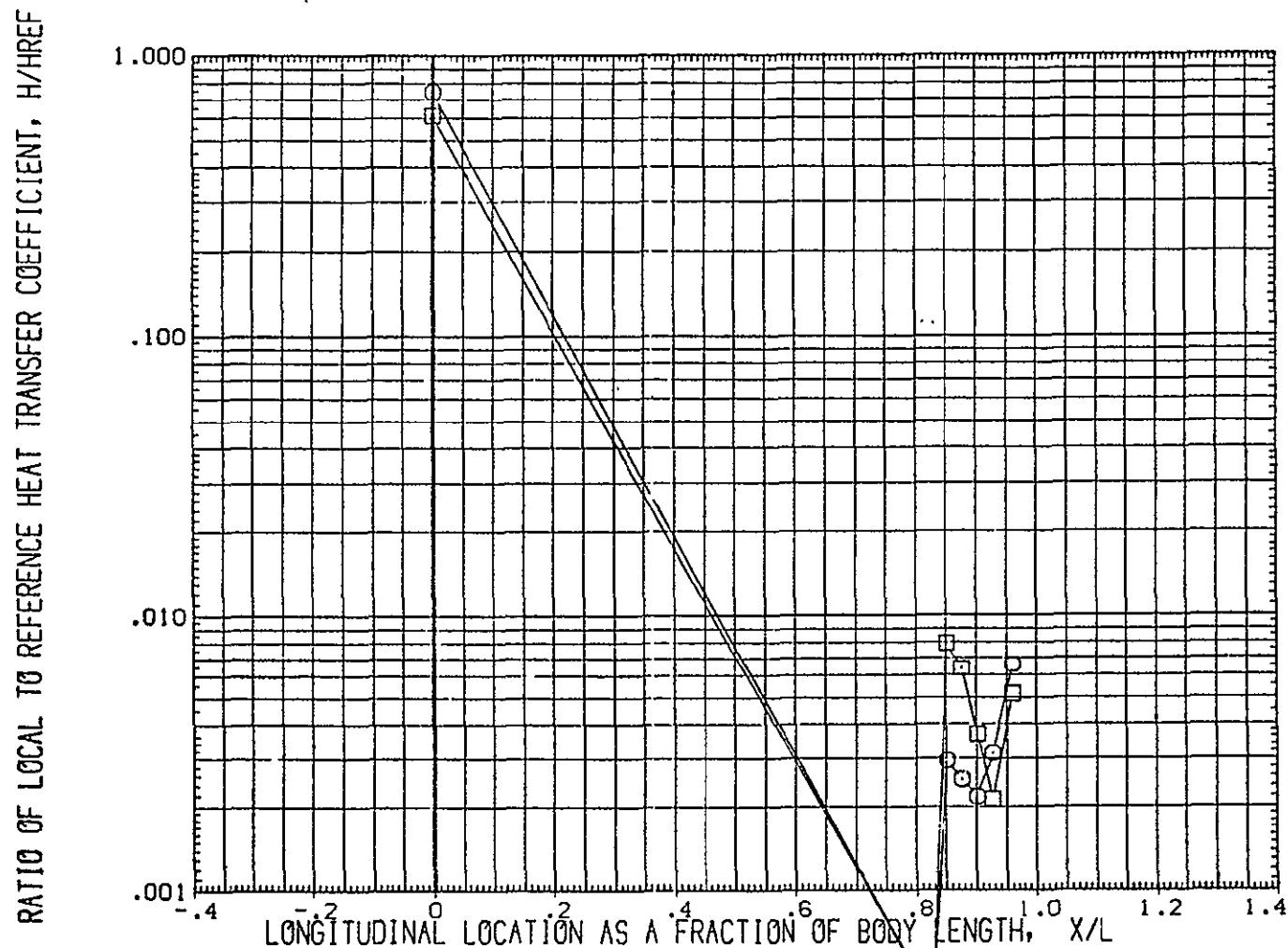


FIG. 7 EFFECT OF PROTUBERANCES ON THE EXTERNAL TANK HEAT TRANSFER ALPHA = 0
MACH = 18.400 HAW/HT = 1.000 PHI = 241.000 PAGE 173

| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ALPHA | BETA |
|-----------------|--|-------|------|
| (RUGT01) | OH12/1H21 (CAL HST 173-100) 37 T TANK | .000 | .000 |
| (RUGT03) | OH12/1H21 (CAL HST 173-100) 37 T-NP TANK | .000 | .000 |

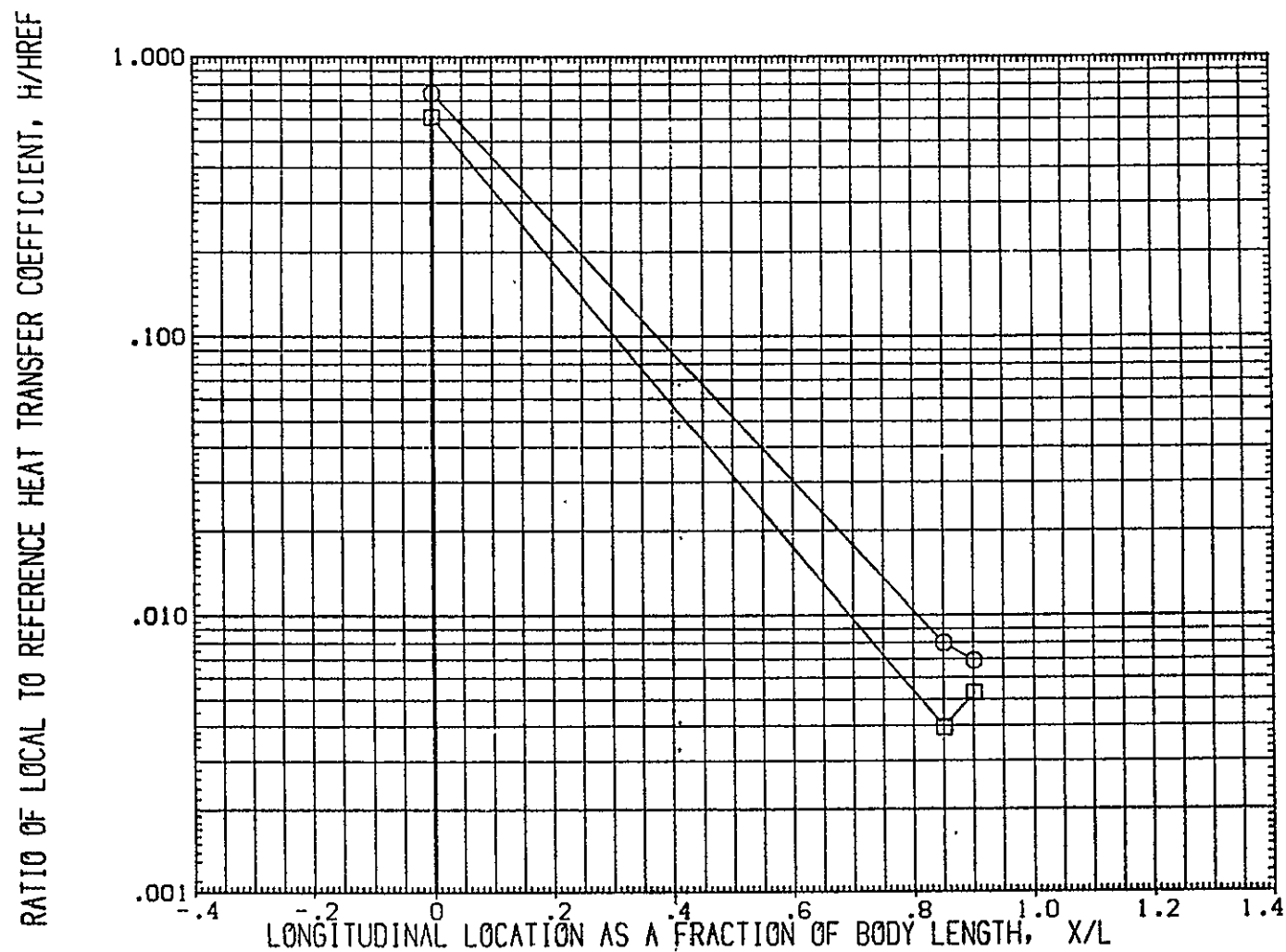


FIG. 7 EFFECT OF PROTUBERANCES ON THE EXTERNAL TANK HEAT TRANSFER ALPHA = 0
MACH = 18.400 HAW/HT= 1.000 PHI = 247.000 PAGE 174

| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ALPHA | BETA |
|-----------------|--|-------|------|
| (RUGT01) | QH12/1H21 (CAL HST 173-100) 37 T TANK | .000 | .000 |
| (RUGT03) | QH12/1H21 (CAL HST 173-100) 37 T-NP TANK | .000 | .000 |

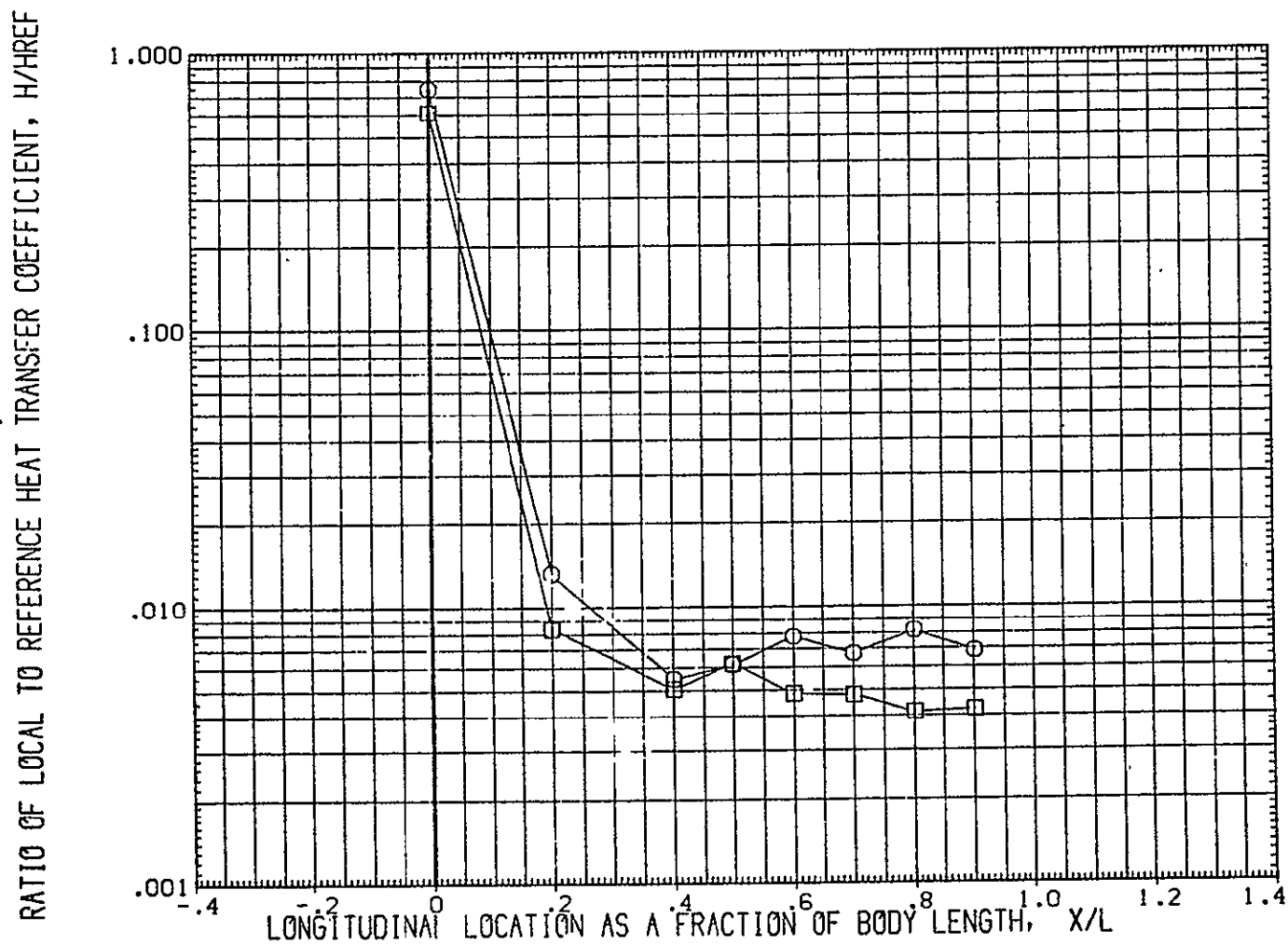


FIG. 7 EFFECT OF PROTUBERANCES ON THE EXTERNAL TANK HEAT TRANSFER ALPHA = 0

MACH = 18.400 HAW/HT = 1.000 PHI = 270.000

| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ALPHA | BETA |
|-----------------|--|-------|------|
| (RUGT01) | OH12/IH21 (CAL HST 173-100) 37 T TANK | .000 | .000 |
| (RUGT03) | OH12/IH21 (CAL HST 173-100) 37 T-NP TANK | .000 | .000 |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

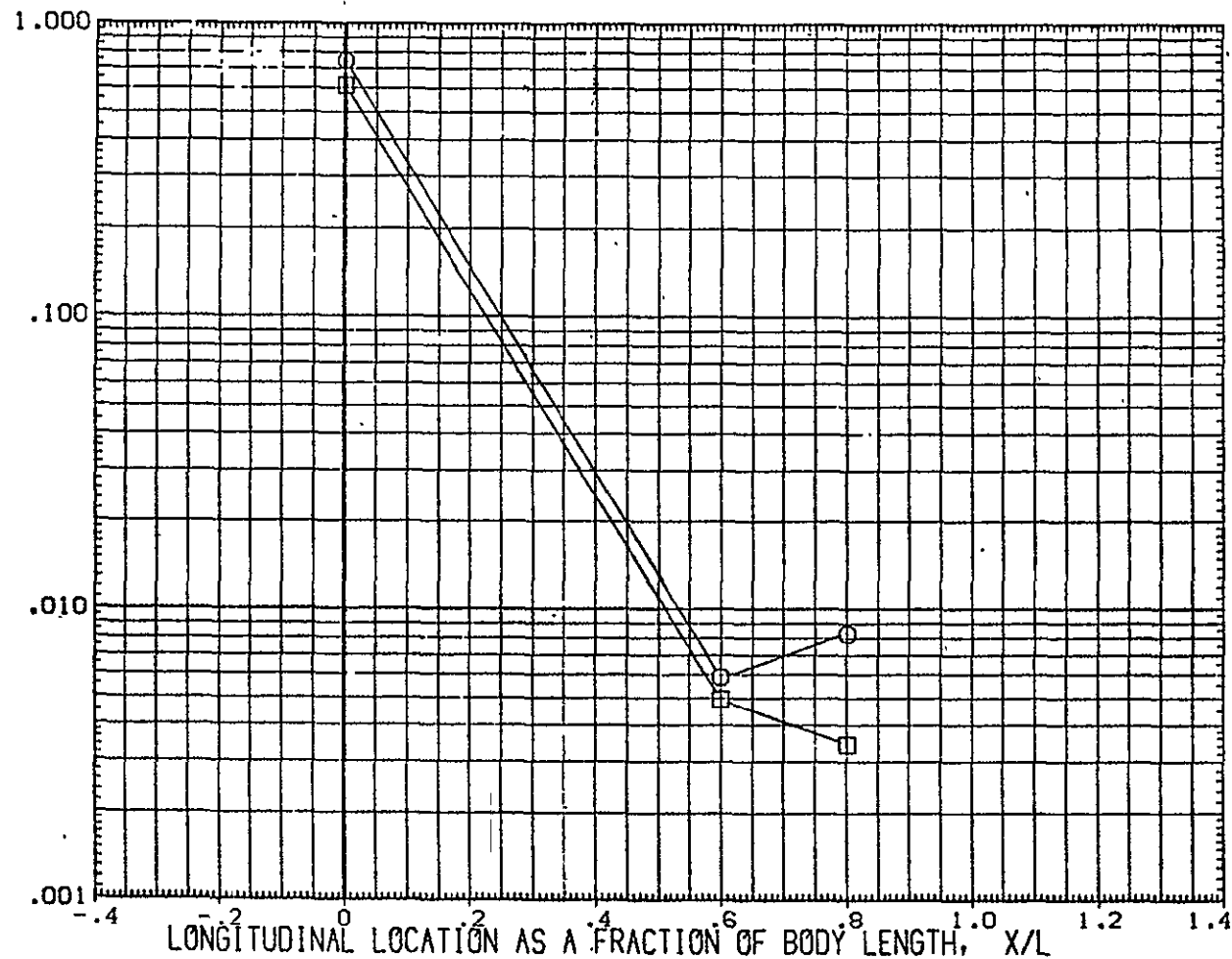


FIG. 7 EFFECT OF PROTUBERANCES ON THE EXTERNAL TANK HEAT TRANSFER $\alpha = 0$
MACH = 18.400 $H_{AW}/H_T = 1.000$ $\phi = 315.000$ PAGE 176

OH12 + IH21 MODEL 37 T(01)/T-NP(03) TANK (IUGT01)

| | | | | | | |
|--------|--------|------|--------|-------------------|------|-----------|
| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
| O | .900 | .000 | 18.400 | ALPHA | .000 | BETA .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU

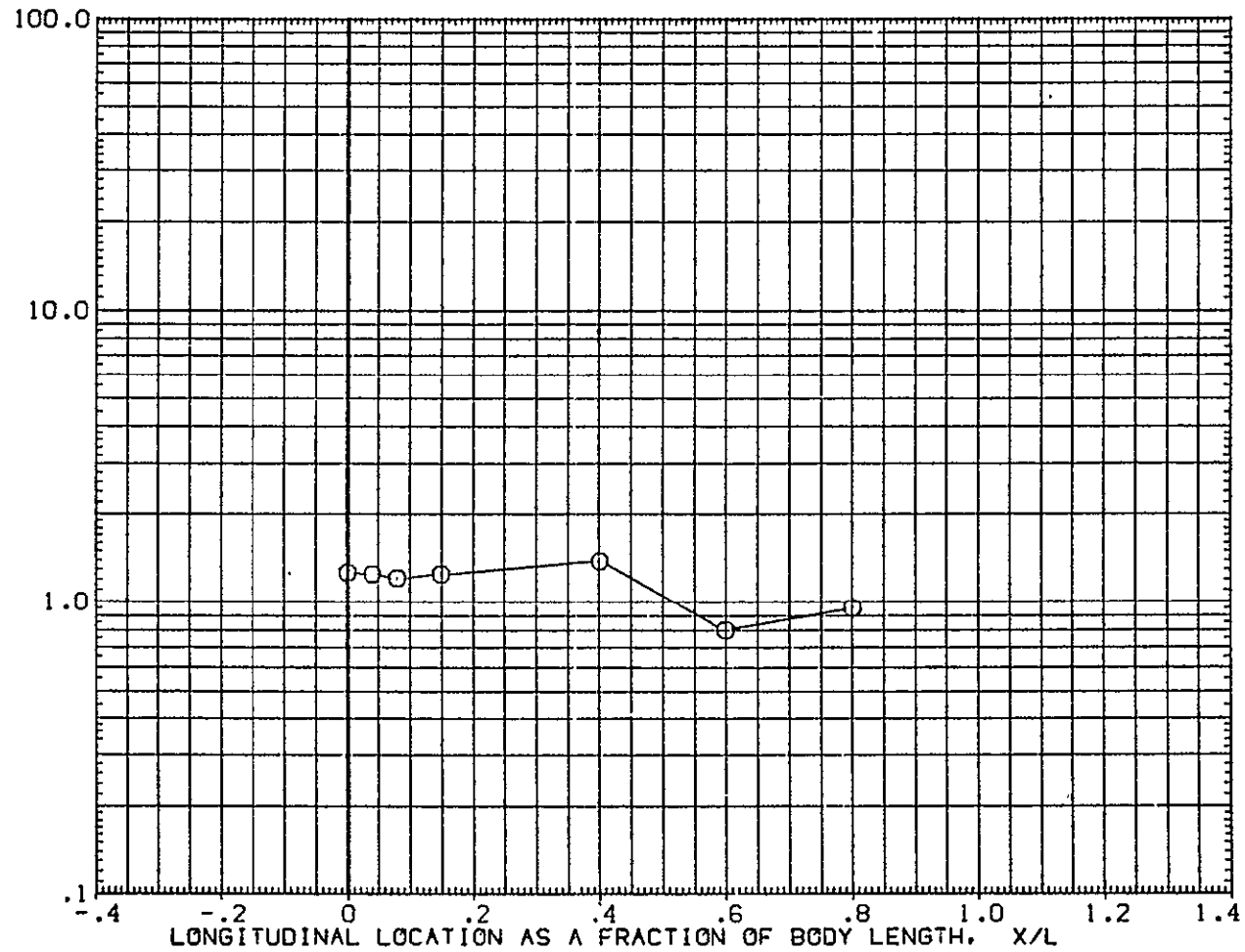


FIG. 7 EFFECT OF PROTUBERANCES ON THE EXTERNAL TANK HEAT TRANSFER ALPHA = 0

OH12 + IH21 MODEL 37 T(01)/T-NP(03) TANK (IUGT01)

| | | | | | | |
|--------|--------|---------|--------|-------------------|------|-----------|
| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
| ○ | .900 | 180.000 | 18.400 | ALPHA | .000 | BETA .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, H_i/H_u

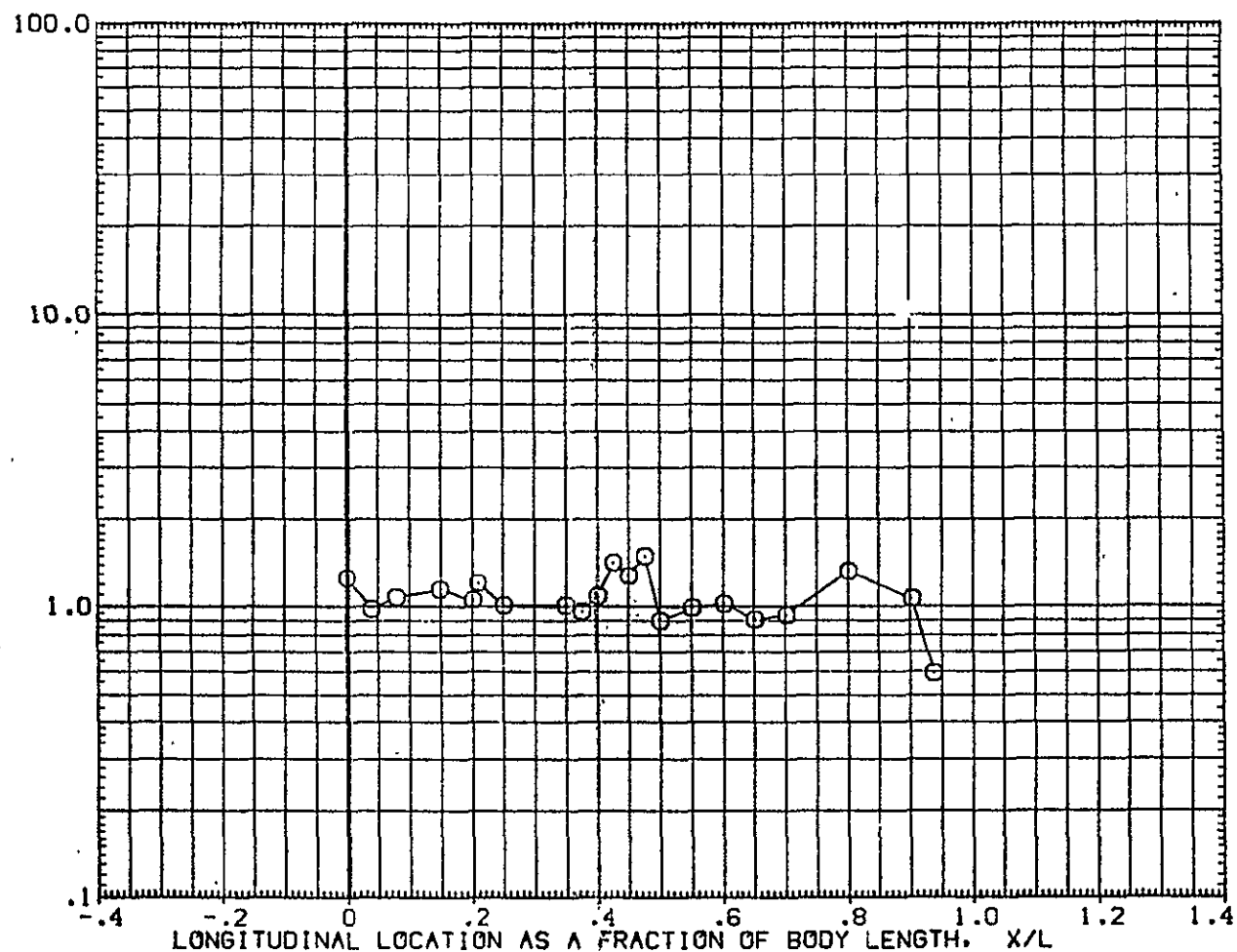


FIG. 7 EFFECT OF PROTUBERANCES ON THE EXTERNAL TANK HEAT TRANSFER ALPHA = 0

REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, h_i/h_u

CH12 + IH21 MODEL 37 T(01)/T-NP(03) TANK (IUGT01)

| SYMBOL | MAW/HT | PHI | PACH | ALPHA | PARAMETRIC VALUES | |
|--------|--------|---------|--------|-------|-------------------|-----------|
| O | .900 | 199.000 | 18,400 | | .000 | BETA .000 |

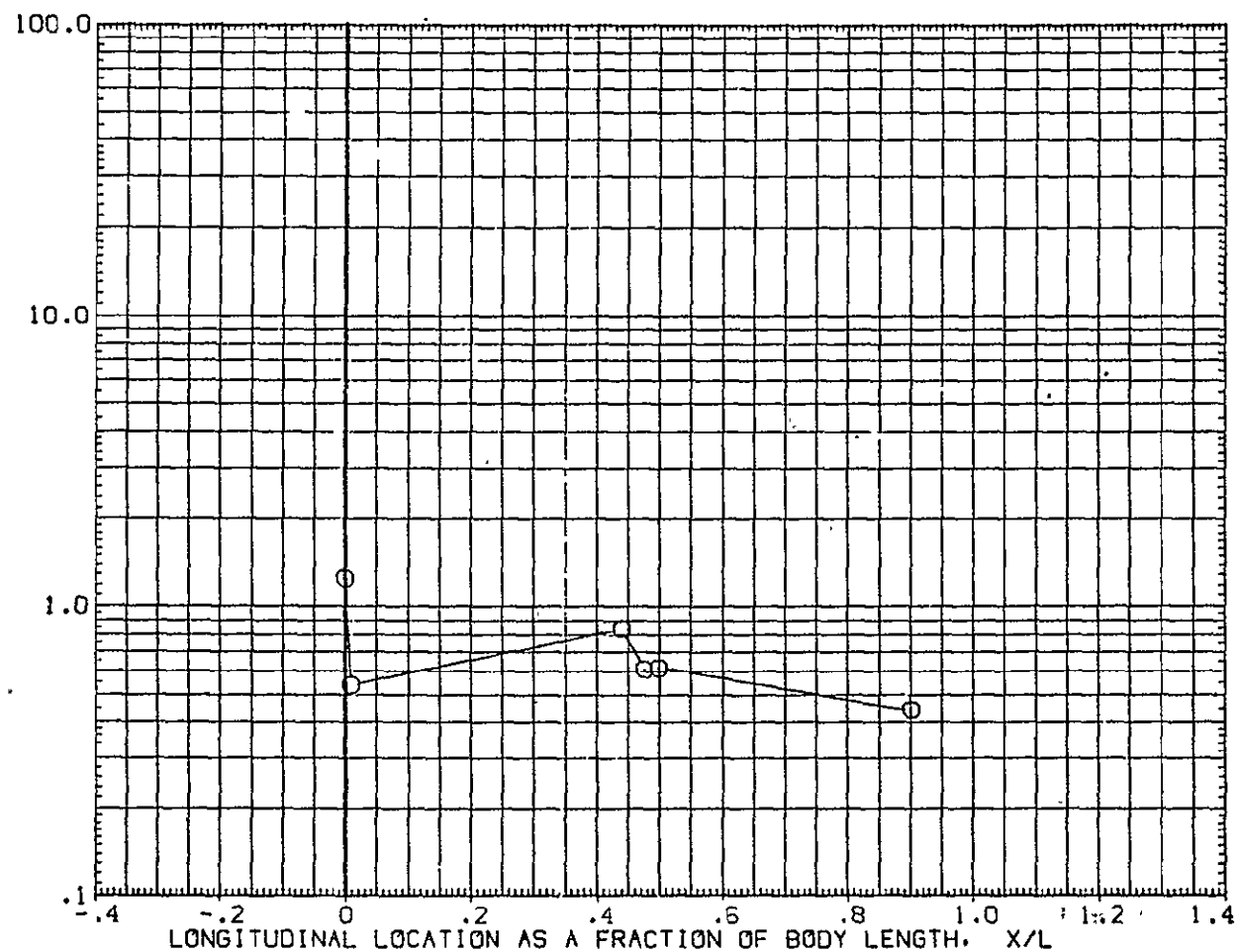


FIG. 7 EFFECT OF PROTUBERANCES ON THE EXTERNAL TANK HEAT TRANSFER ALPHA = 0

OH12 + IH21 MODEL 37 T(01)/T-NP(03) TANK (IUGT01)

SYMBOL
O
HAW/HT
.900
PHI
221.000
MACH
18.400

PARAMETRIC VALUES
ALPHA
.000
BETA
.000

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU

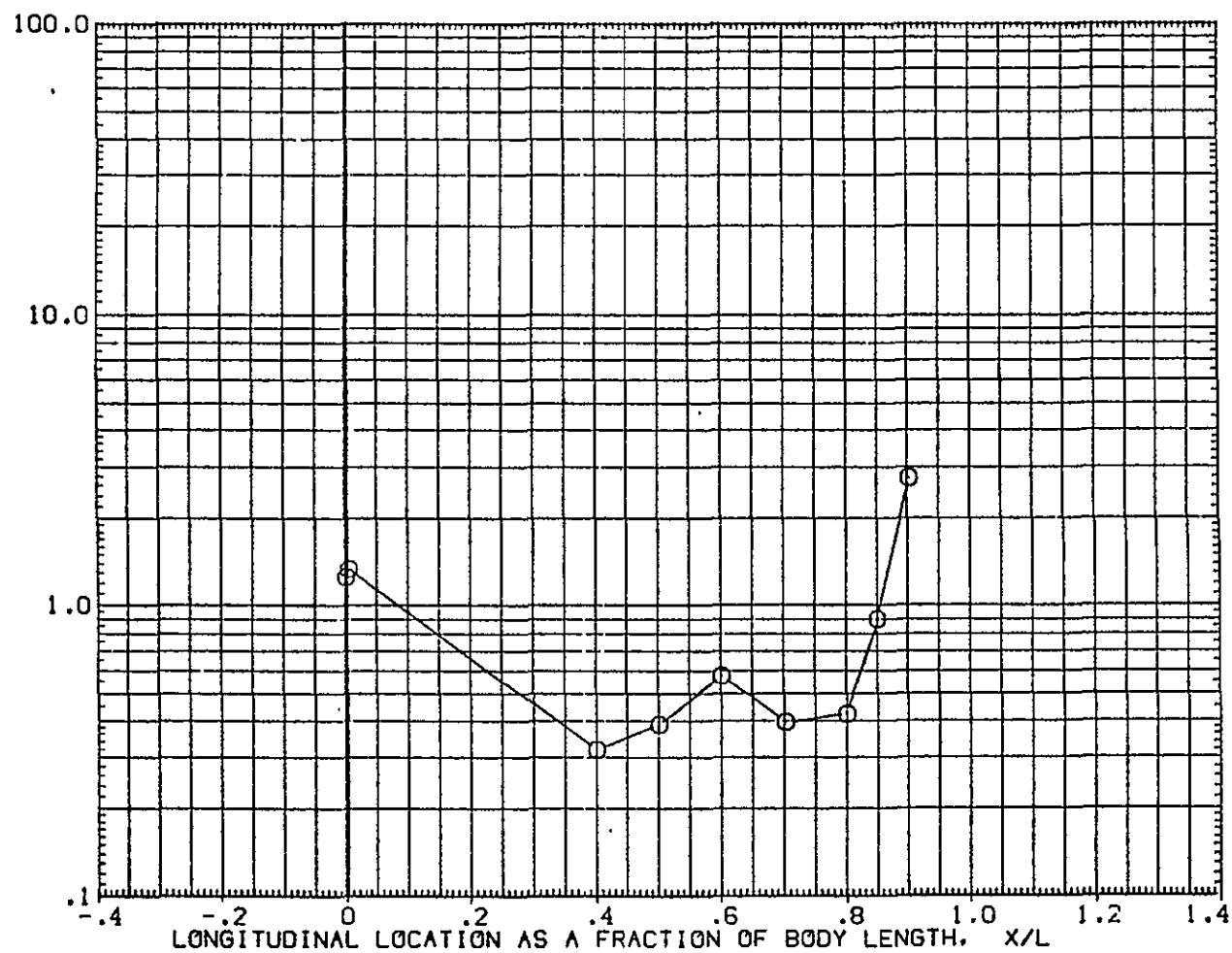


FIG. 7 EFFECT OF PROTUBERANCES ON THE EXTERNAL TANK HEAT TRANSFER ALPHA = 0

OH12 + IH21 MODEL 37 T(01)/T-NP(03) TANK (1UGT01)

| | | | | | | |
|--------|--------|---------|--------|-------------------|------|-----------|
| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
| O | .900 | 241.000 | 18.400 | ALPHA | .000 | BETA .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU

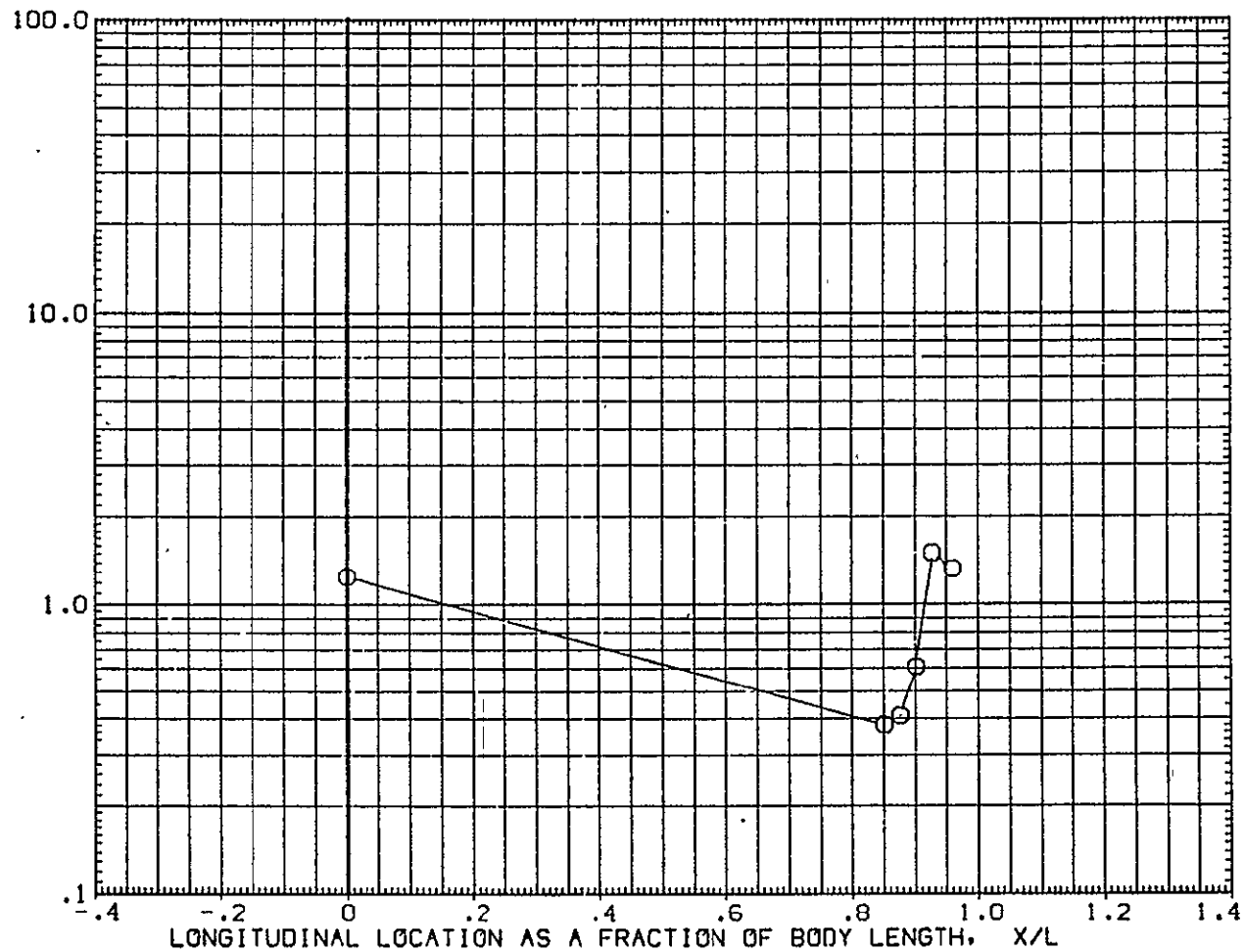


FIG. 7 EFFECT OF PROTUBERANCES ON THE EXTERNAL TANK HEAT TRANSFER ALPHA = 0

OH12 + IH21 MODEL 37 T(01)/T-NP(03) TANK (IUGT01)

| | | | | | | |
|--------|--------|---------|--------|-------------------|------|-----------|
| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
| ○ | .900 | 247.000 | 18.400 | ALPHA | .000 | BETA .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, H_i/H_u

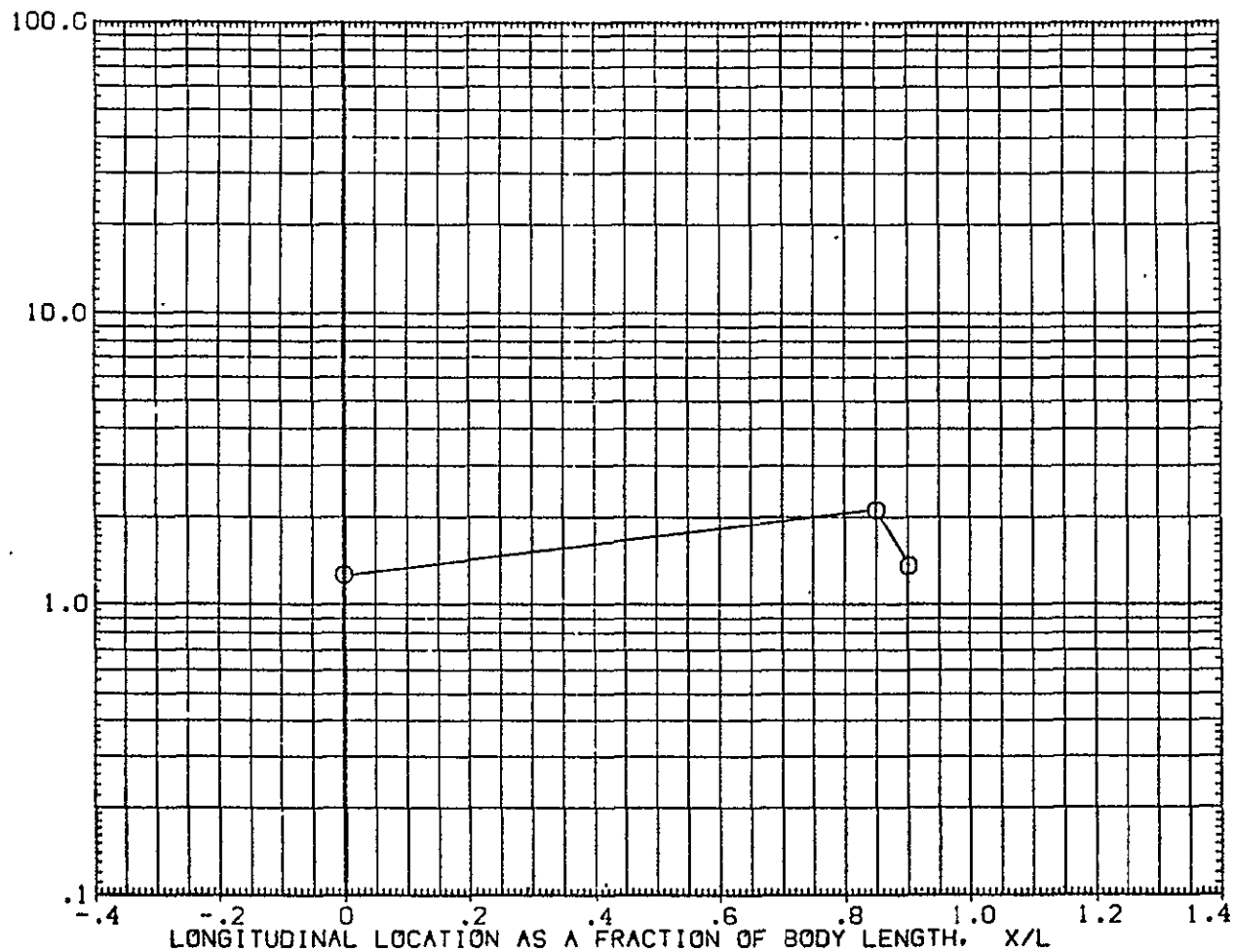


FIG. 7 EFFECT OF PROTUBERANCES ON THE EXTERNAL TANK HEAT TRANSFER ALPHA = 0

CH12 + IH21 MODEL 37 T(01)/T-WP(03) TANK (IUGT01)

| | | | | | | | |
|--------|--------|---------|--------|-------------------|------|------|------|
| SYMBOL | HAW/HI | PHI | MACH | PARAMETRIC VALUES | | | |
| O | .900 | 270.000 | 18.400 | ALPHA | .000 | BETA | .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU

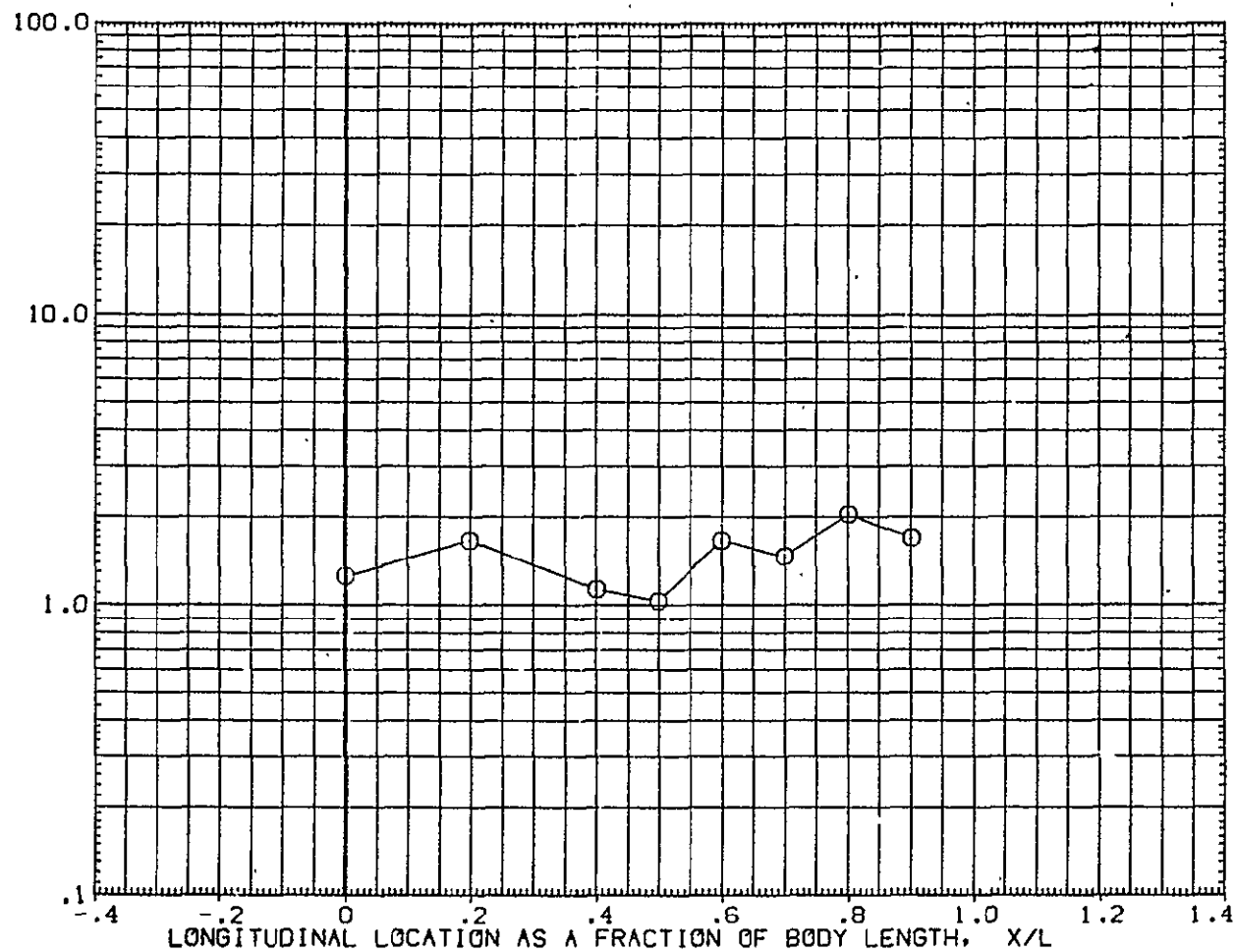


FIG. 7 EFFECT OF PROTUBERANCES ON THE EXTERNAL TANK HEAT TRANSFER $\alpha = 0$

OH12 + IH21 MODEL 37 T(01)/T-NP(03) TANK (IUGT01)

| | | | | | | |
|--------|--------|---------|--------|-------------------|------|-----------|
| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
| ○ | .900 | 315.000 | 18.400 | ALPHA | .000 | BETA .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU

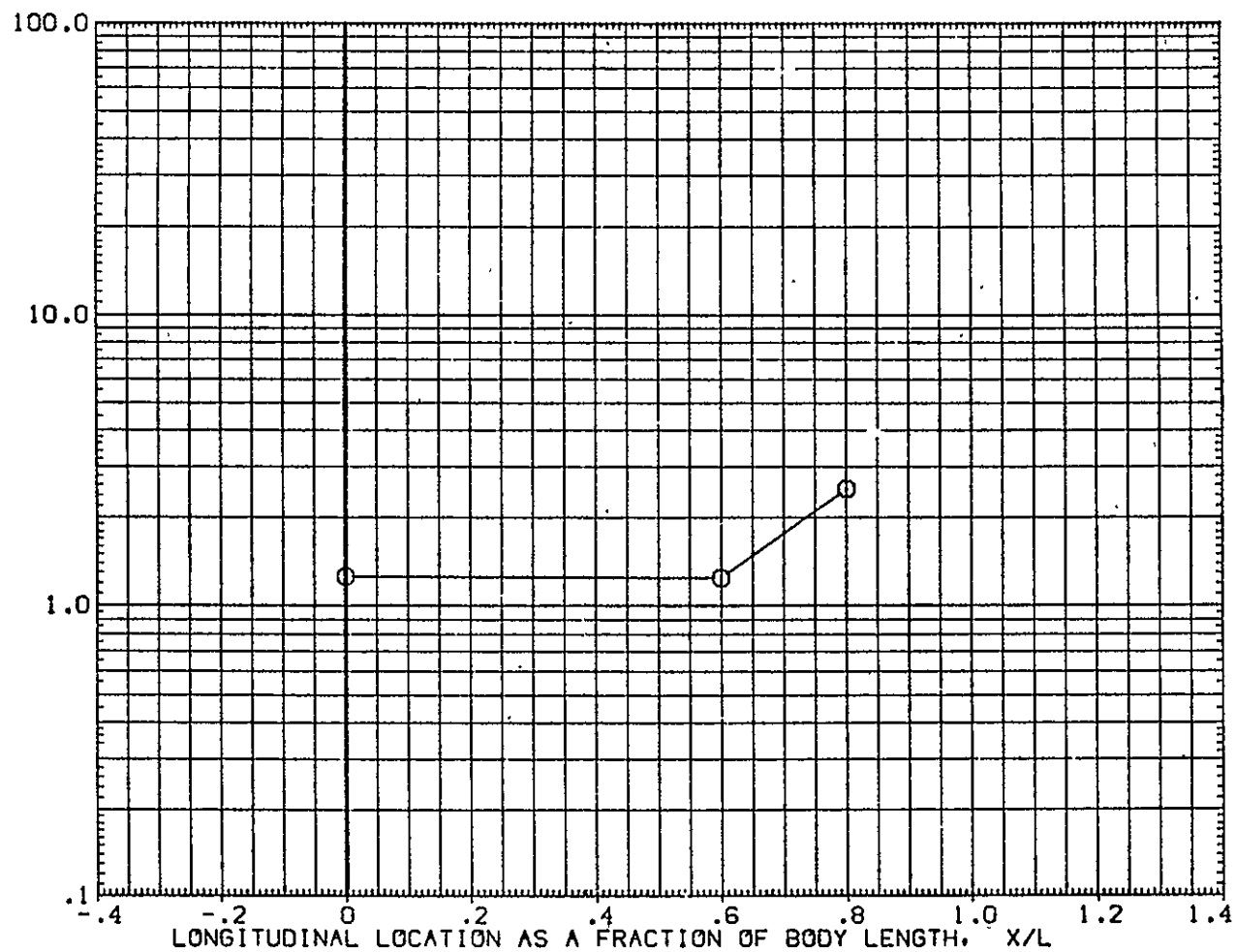


FIG. 7 EFFECT OF PROTUBERANCES ON THE EXTERNAL TANK HEAT TRANSFER ALPHA = 0

0H12/IH21 (CAL HST 173-100) 37 0

FUSELAGE (RUGB07)

| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
|--------|--------|------|-------|-------------------|------|------|
| ○ | .850 | .000 | 6.997 | ALPHA | .000 | BETA |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

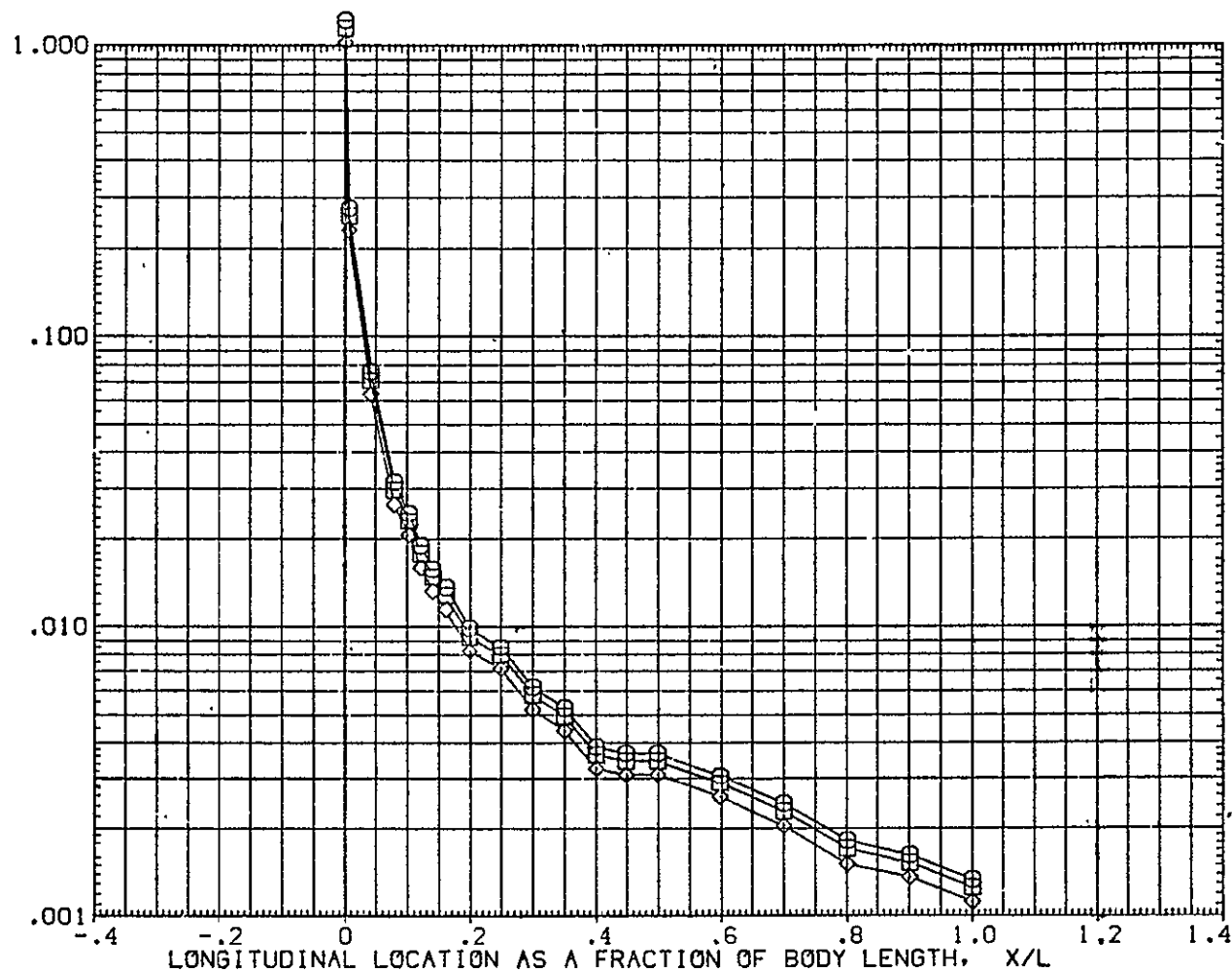
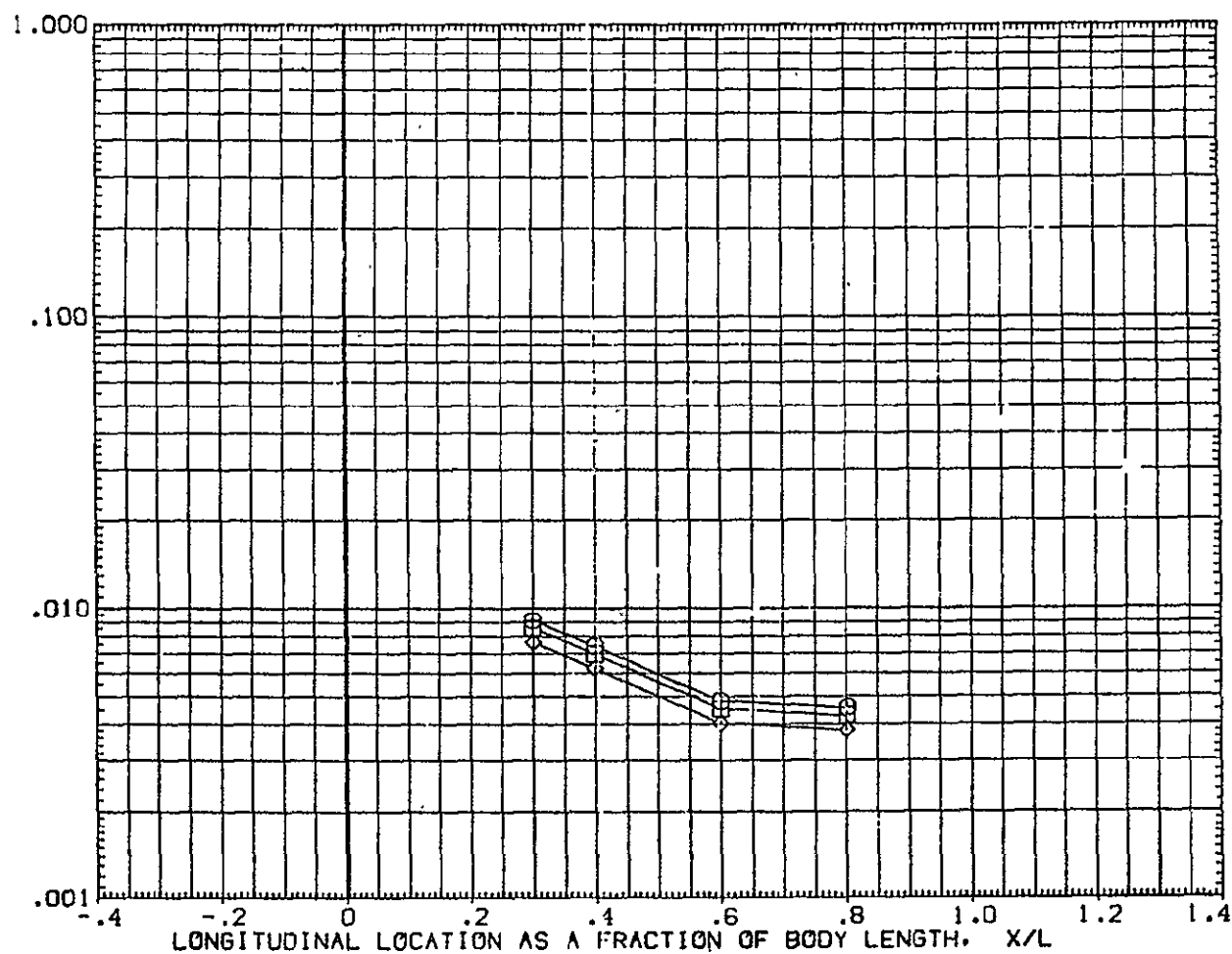
RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF} 

FIG. 8 EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER ALPHA = 0

OH12/IH21 (CAL HST 173-100) 37 0

FUSELAGE (RUGB07)

| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
|--------|--------|--------|-------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| □ | .850 | 25.000 | 6.937 | .000 | | .000 |
| ◇ | .900 | | | | | |
| | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF} FIG. 8 EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER $\alpha = 0$

0H12/1H21 (CAL HST 173-100) 37 0

FUSELAGE (RUGB07)

| SYMBOL | HAY/HT | PHI | MACH | PARAMETRIC VALUES | | |
|--------|--------|--------|-------|-------------------|------|------|
| ◇ | .850 | 30.000 | 6.997 | ALPHA | .000 | BETA |
| □ | .900 | | | | | |
| □ | 1.000 | | | | | .000 |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

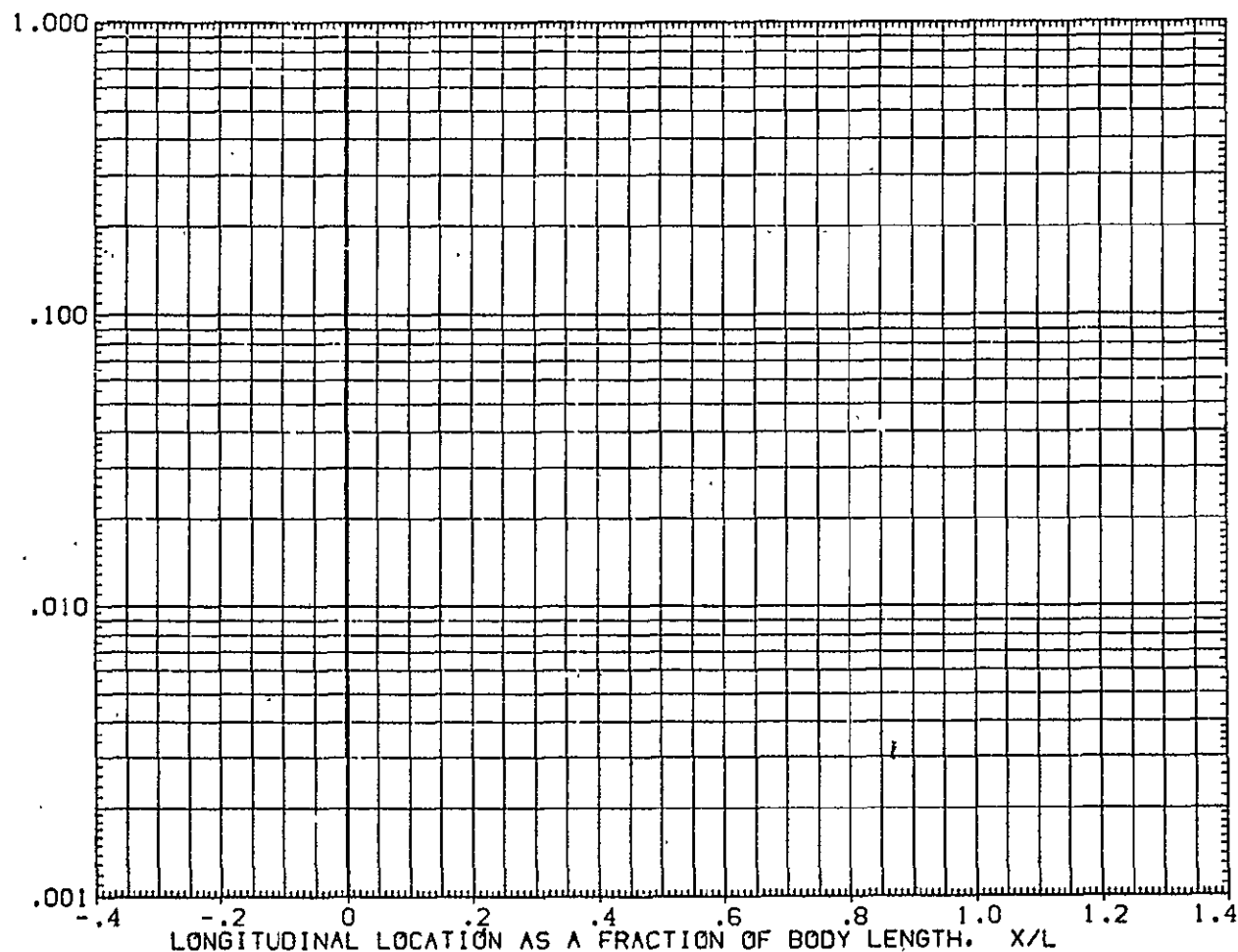


FIG. 8 EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER ALPHA = 0

0H12/1H21 (CAL HST 173-100) 37 0

FUSELAGE (RUGB07)

| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
|--------|--------|---------|-------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| ○ | .850 | 180.000 | 6.997 | .000 | | .000 |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

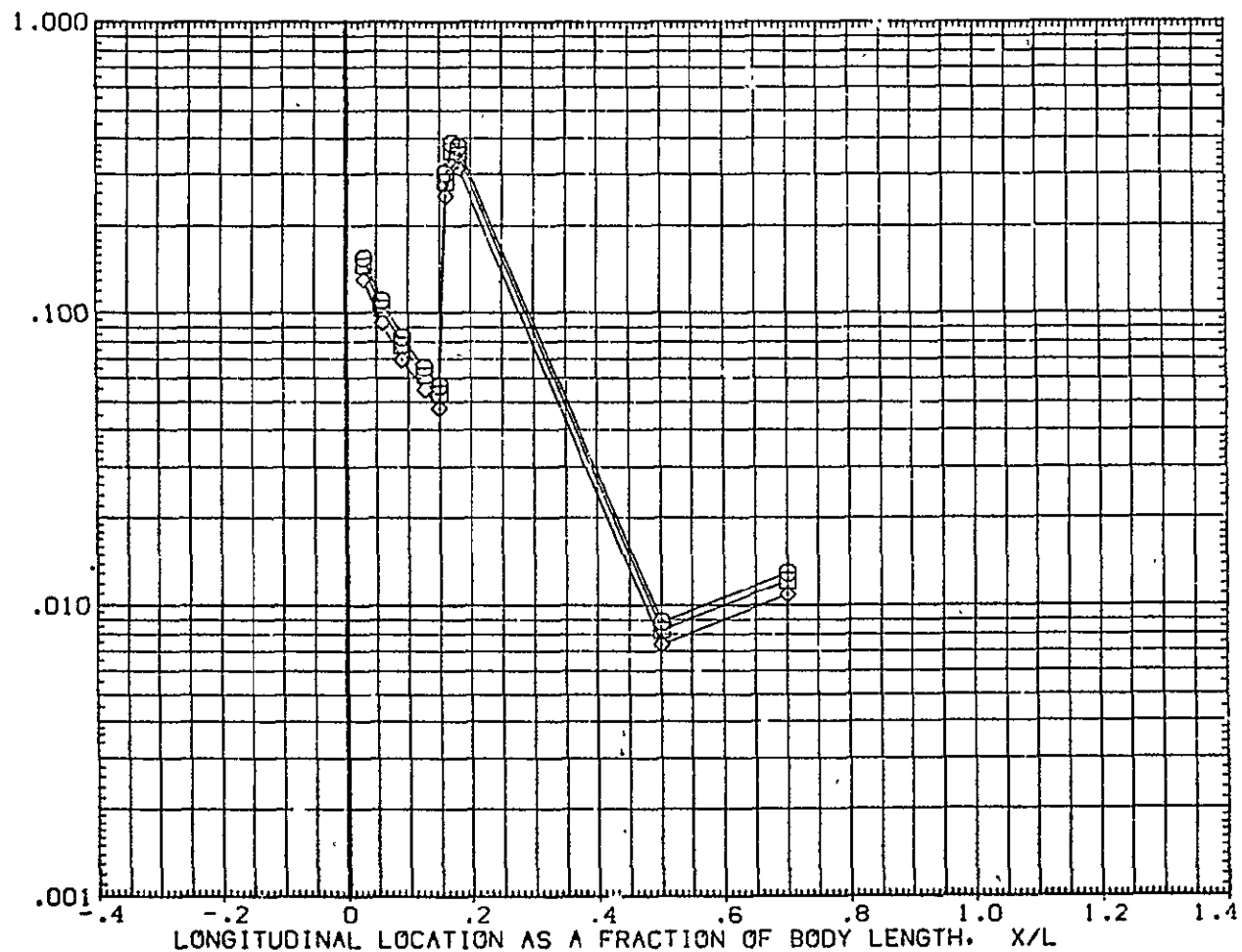
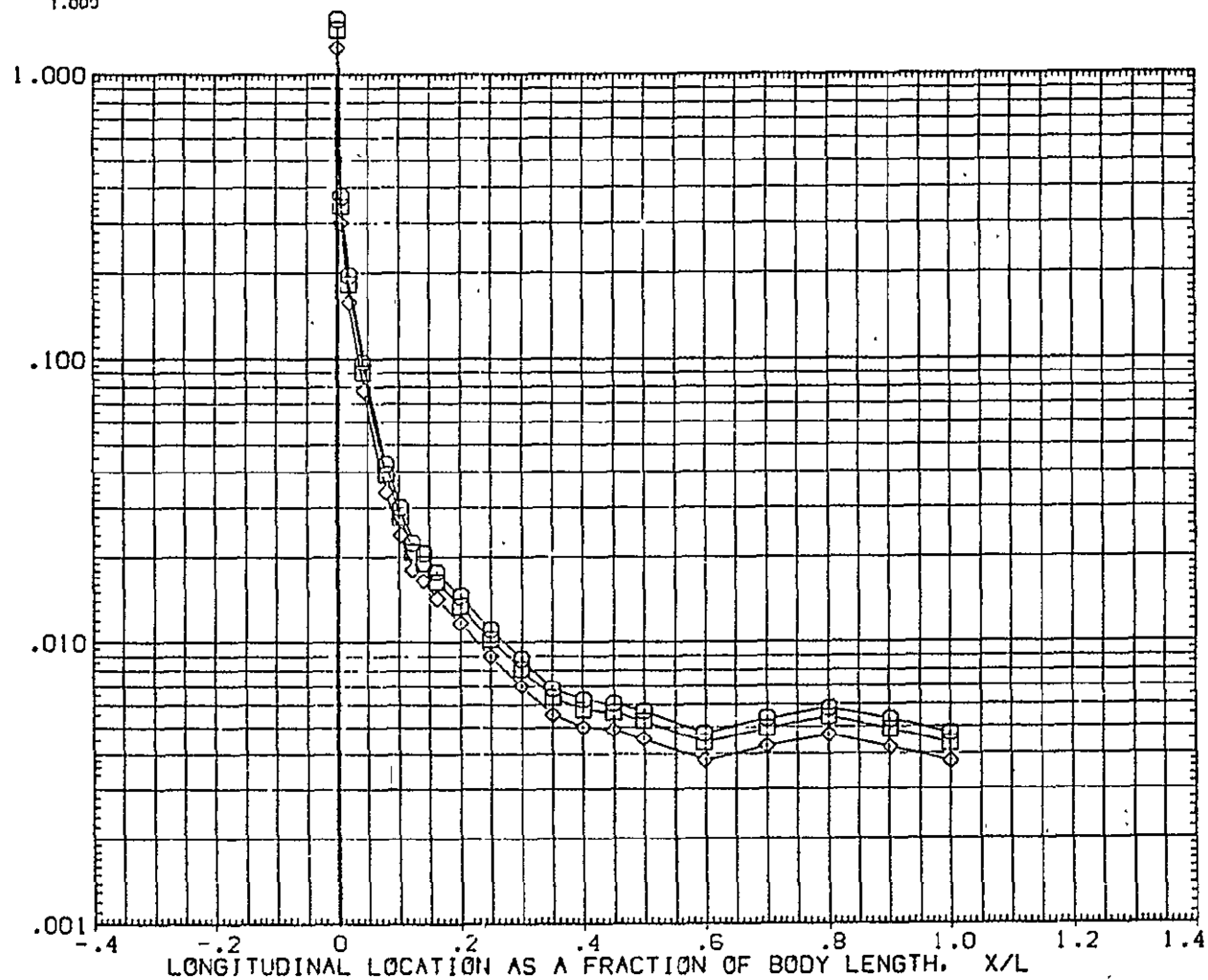
RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, h/h_{REF} 

FIG. 8 EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER ALPHA = 0

OH12/1H21 (CAL HST 173-100) 37 0

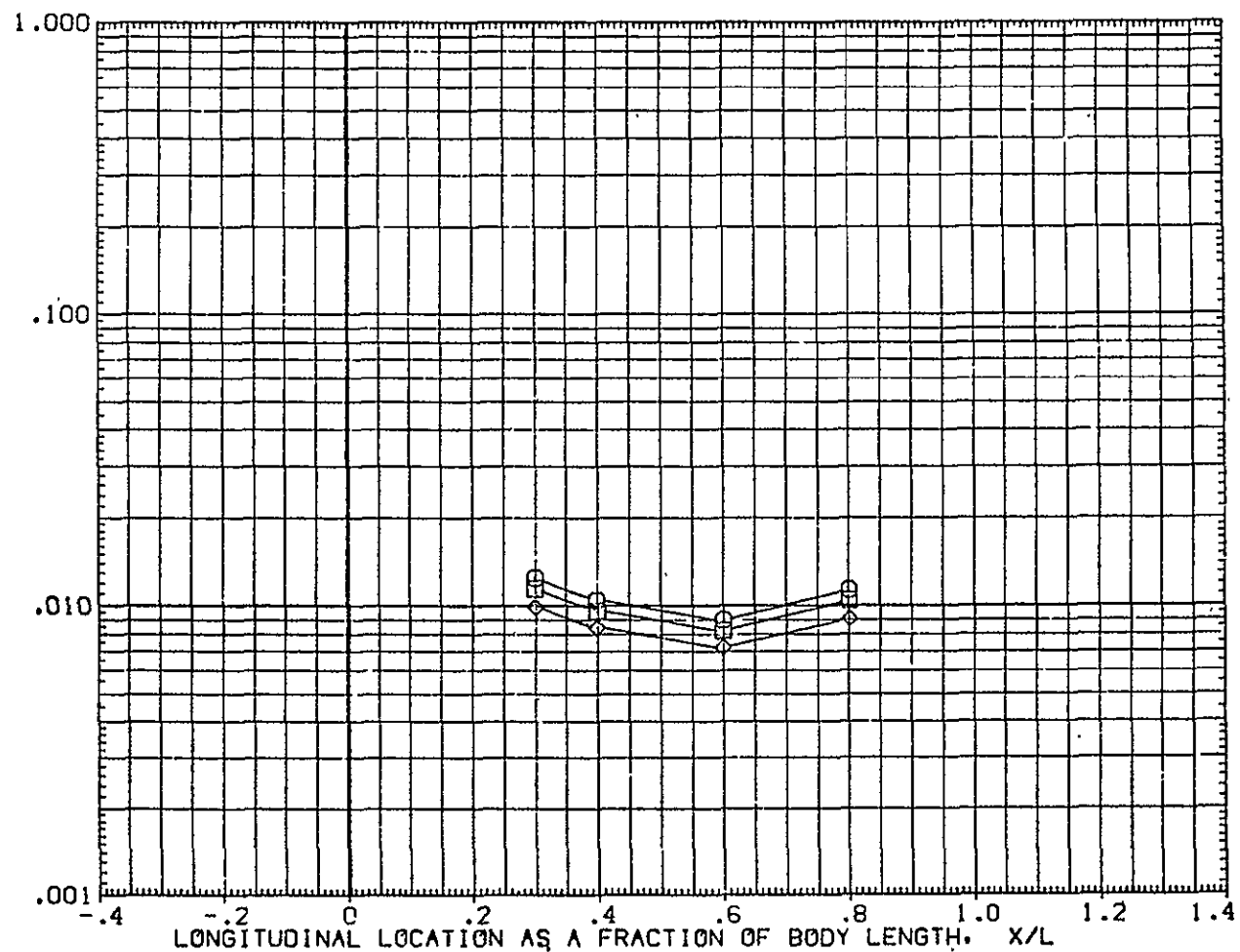
FUSELAGE (RUGB07)

| SYMBOL | HAW/HT | PHI | MACH | ALPHA | PARAMETRIC VALUES | | BETA |
|--------|--------|------|-------|-------|-------------------|--|------|
| ◇ | .850 | .000 | 7.614 | .000 | | | .000 |
| □ | .900 | | | | | | |
| ◇ | 1.000 | | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF} FIG. 8 EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER $\alpha = 0$

0H12/1H21 (CAL HST 173-100) 37 0

FUSELAGE (RUGB07)

SYMBOL
□
◇HAW/HT
.850
.900
1.000PHI
25.000MACH
7.614PARAMETRIC VALUES
ALPHA .000 BETA .000RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF} FIG. 8 EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER $\alpha = 0$

OH12/IH21 (CAL PST 173-100) 37 0

FUSELAGE (RUGB07)

| | | | | | | |
|--------|--------|--------|-------|-------|-------------------|------|
| SYMBOL | HAW/HT | PHI | MACH | ALPHA | PARAMETRIC VALUES | |
| ◇ | .850 | 30.000 | 7.614 | .000 | BETA | .000 |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

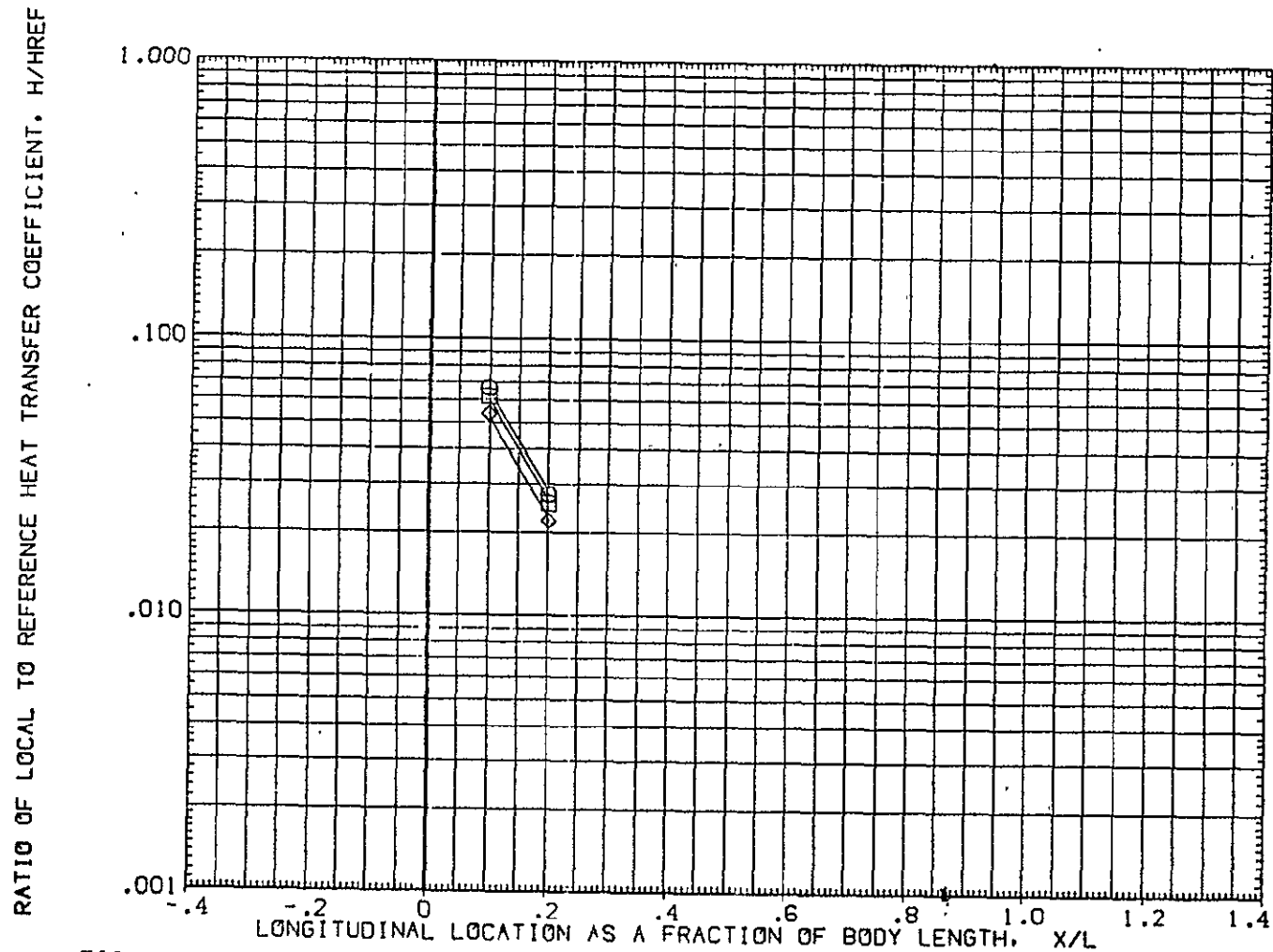
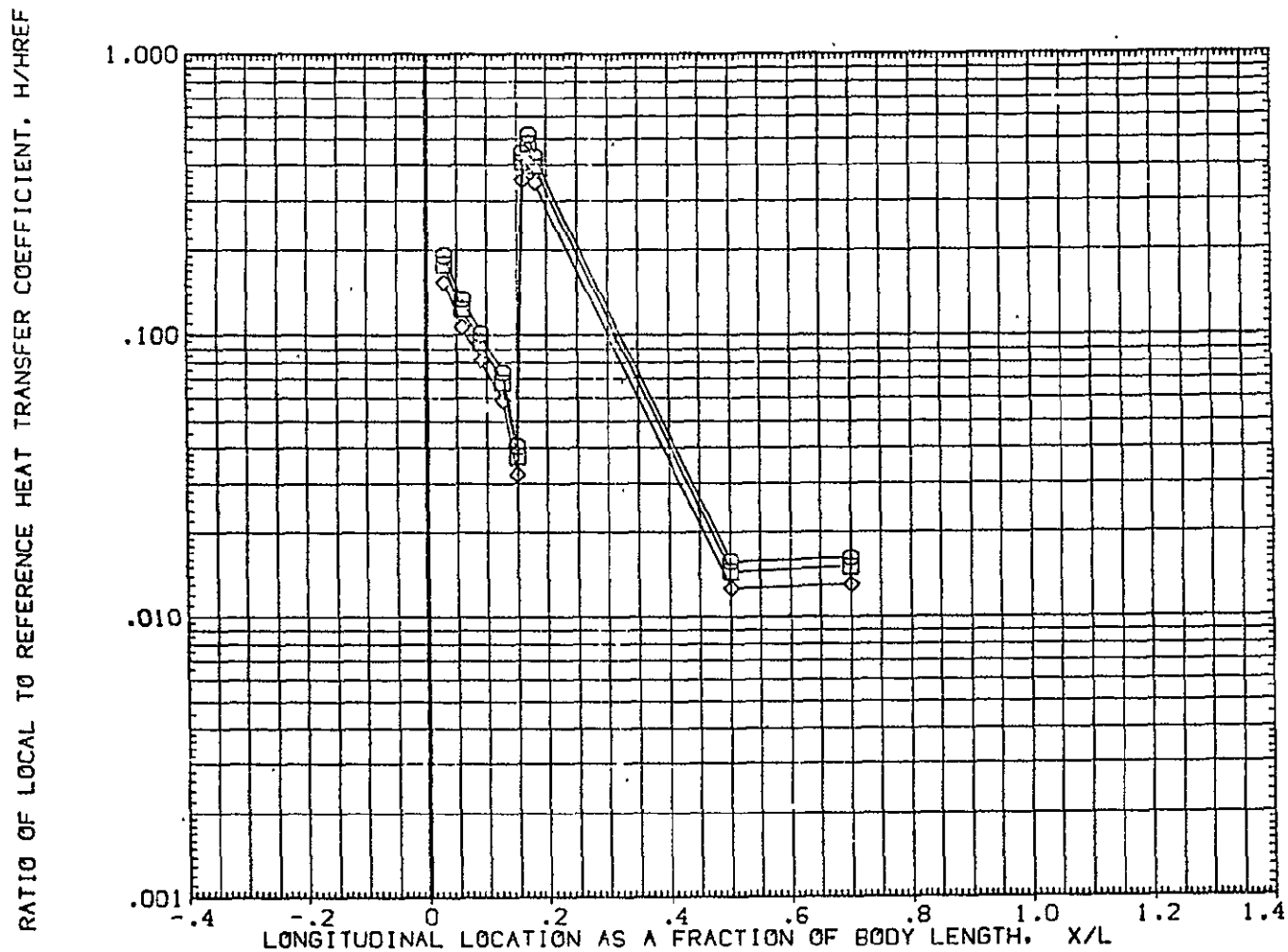


FIG. 8 EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER $\alpha = 0$

OH12/IH21 (CAL HST 173-100) 37 0

FUSELAGE (RUGB07)

| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
|--------|--------|---------|-------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| ◇ | .850 | 180.000 | 7.614 | .000 | BETA | .000 |
| □ | .900 | | | | | |
| ○ | 1.000 | | | | | |

FIG. 8 EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER $\alpha = 0$

0412/IH21 (CAL HST I73-100) 37 0

FUSELAGE (RUGB07)

| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
|--------|--------|------|--------|-------------------|------|--|
| | | | | ALPHA | BETA | |
| ○ | .850 | .000 | 16.060 | .000 | .000 | |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

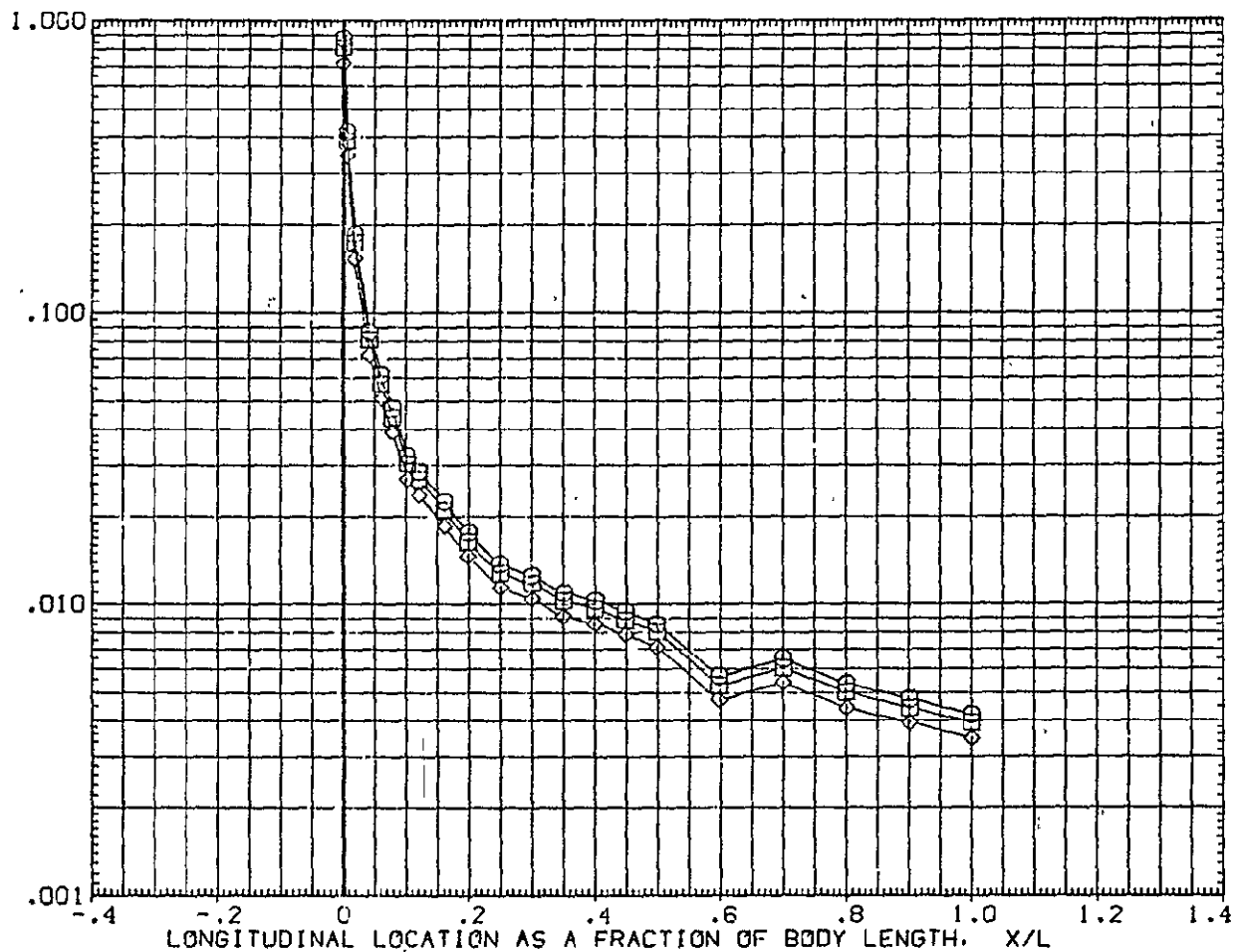
RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF} 

FIG. 8 EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER ALPHA = 0

REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR

OH12/IH21 (CAL HST 173-100) 37 0

FUSELAGE (RUGB07)

| | | | | | | |
|--------|--------|--------|--------|-------|-------------------|------|
| SYMBOL | HAW/HT | PHI | MACH | ALPHA | PARAMETRIC VALUES | |
| ○ | .850 | 25.000 | 16.060 | .000 | BETA | .000 |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

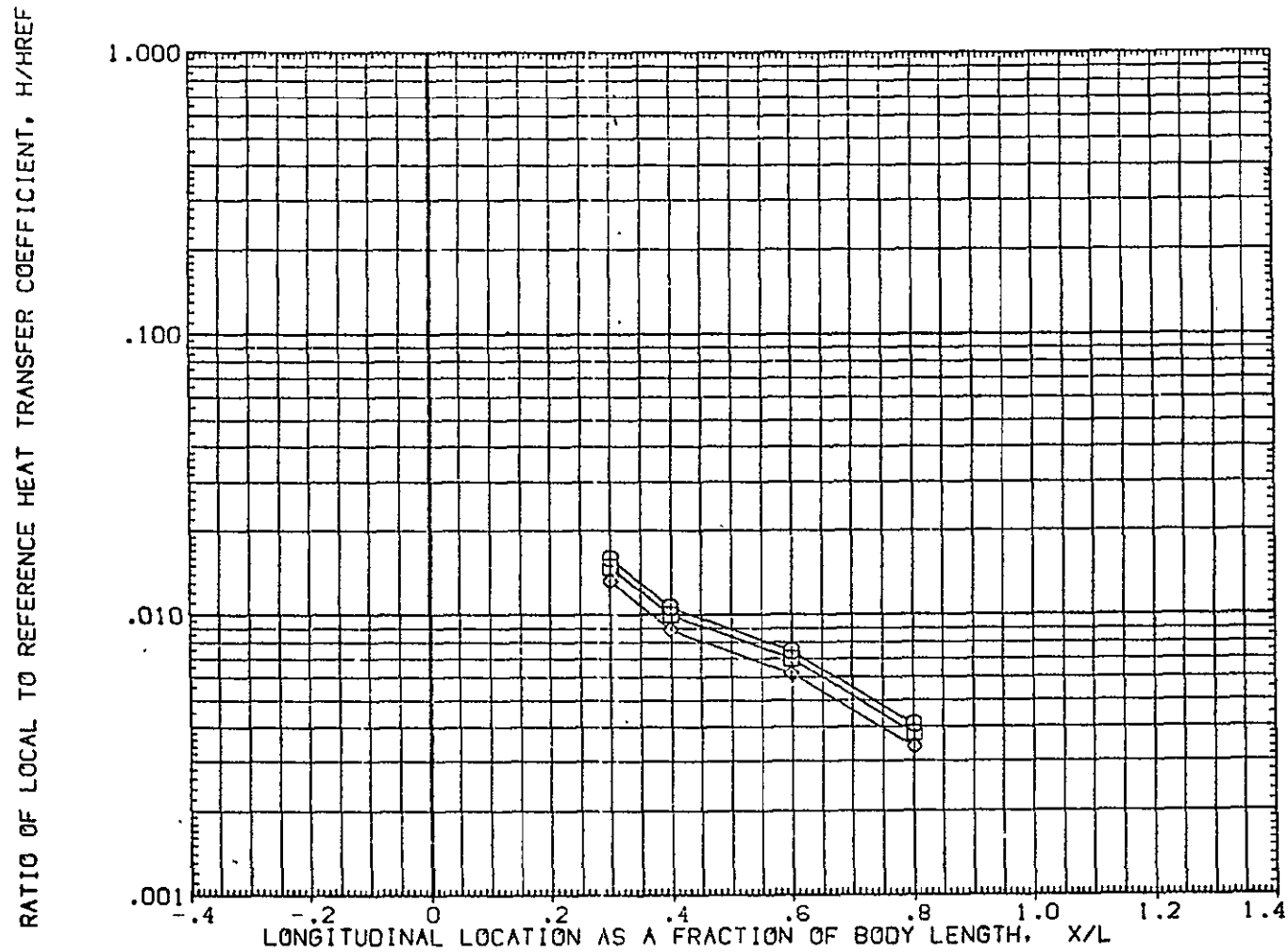


FIG. 8 EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER ALPHA = 0

OH12/IH21 (CAL HST 173-100) 37 0

FUSELAGE (RUGB07)

| SYMBOL | HAM/HT | PHI | MACH | PARAMETRIC VALUES | | |
|--------|--------|--------|--------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| ◇ | .850 | 30.000 | 16.060 | .000 | .000 | .000 |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

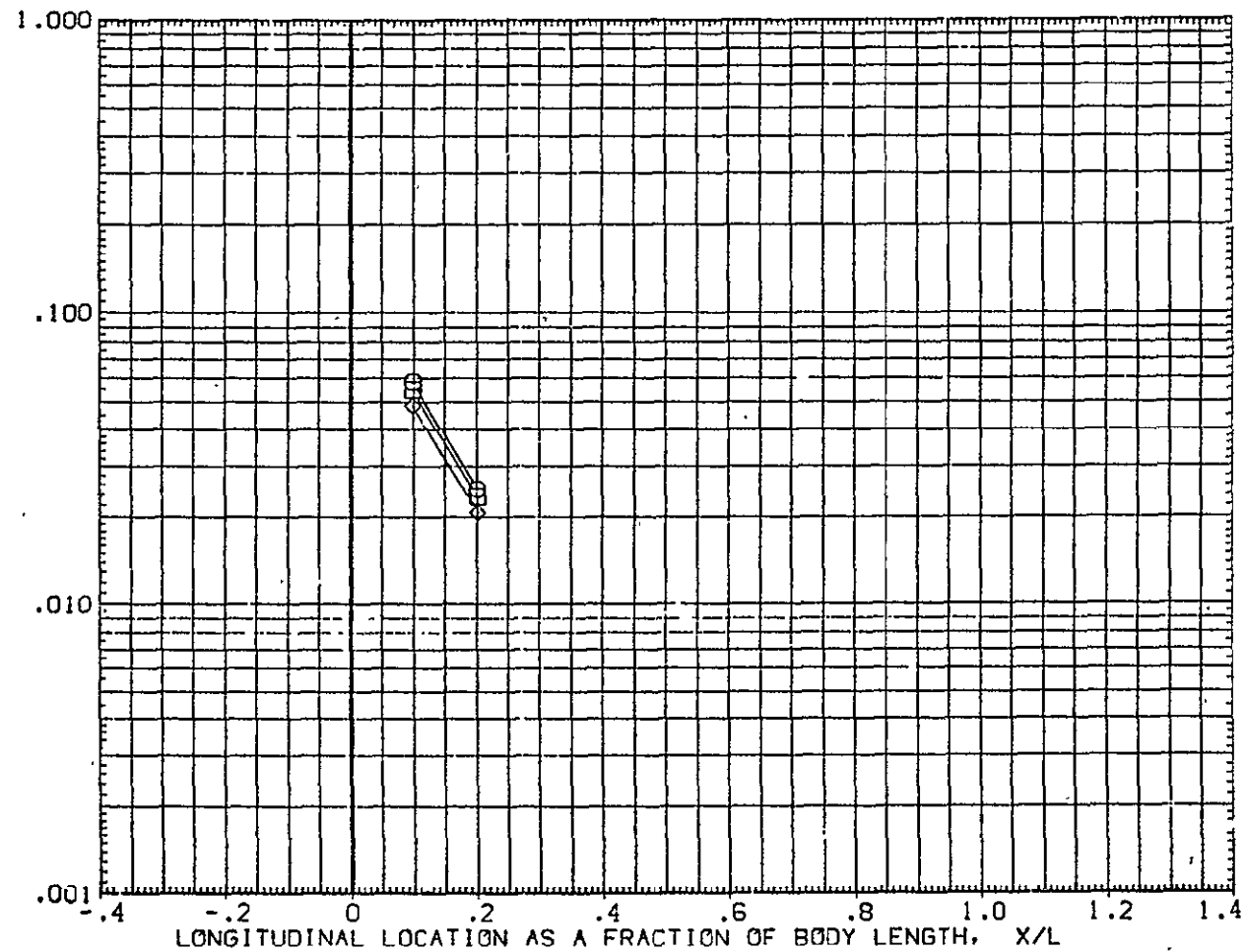
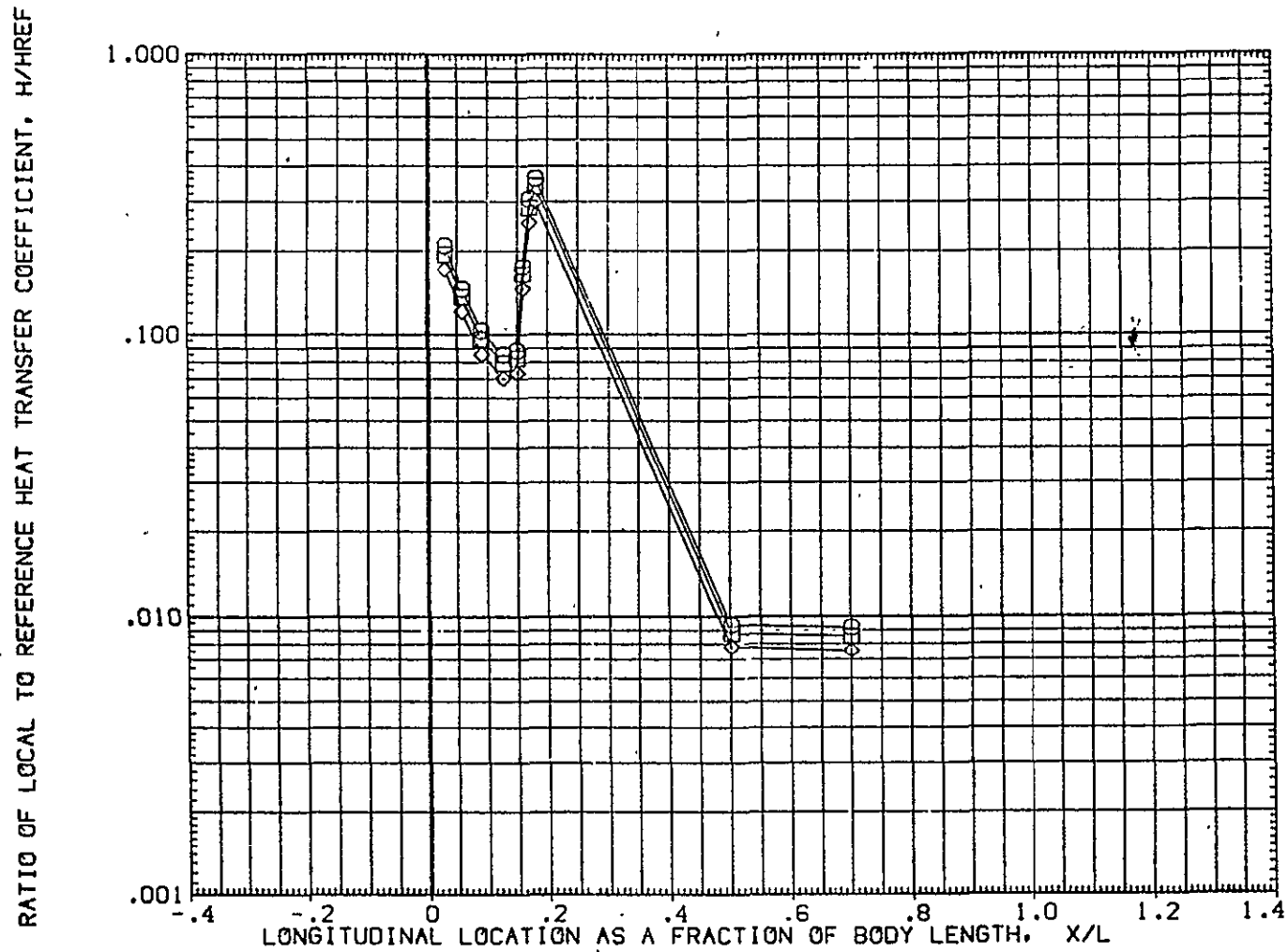


FIG. 8 EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER ALPHA = 0

0H12/1H21 (CAL HST 173-100) 37 0

FUSELAGE (RUGB07)

| SYMBOL | HAW/HT | PHI | MACH | ALPHA | PARAMETRIC VALUES | |
|--------|--------|---------|--------|-------|-------------------|------|
| ◇ | .850 | 180.000 | 16.060 | .000 | BETA | .000 |
| □ | .900 | | | | | |
| ○ | 1.000 | | | | | |

FIG. 8 EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER $\alpha = 0$

0H12/IH21 (CAL HST 173-100) 37 0

FUSELAGE (RUGB07)

| | | | | | | |
|--------|--------|------|--------|-------------------|------|------|
| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
| □ | .850 | .000 | 18.310 | ALPHA | .000 | BETA |
| ◇ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

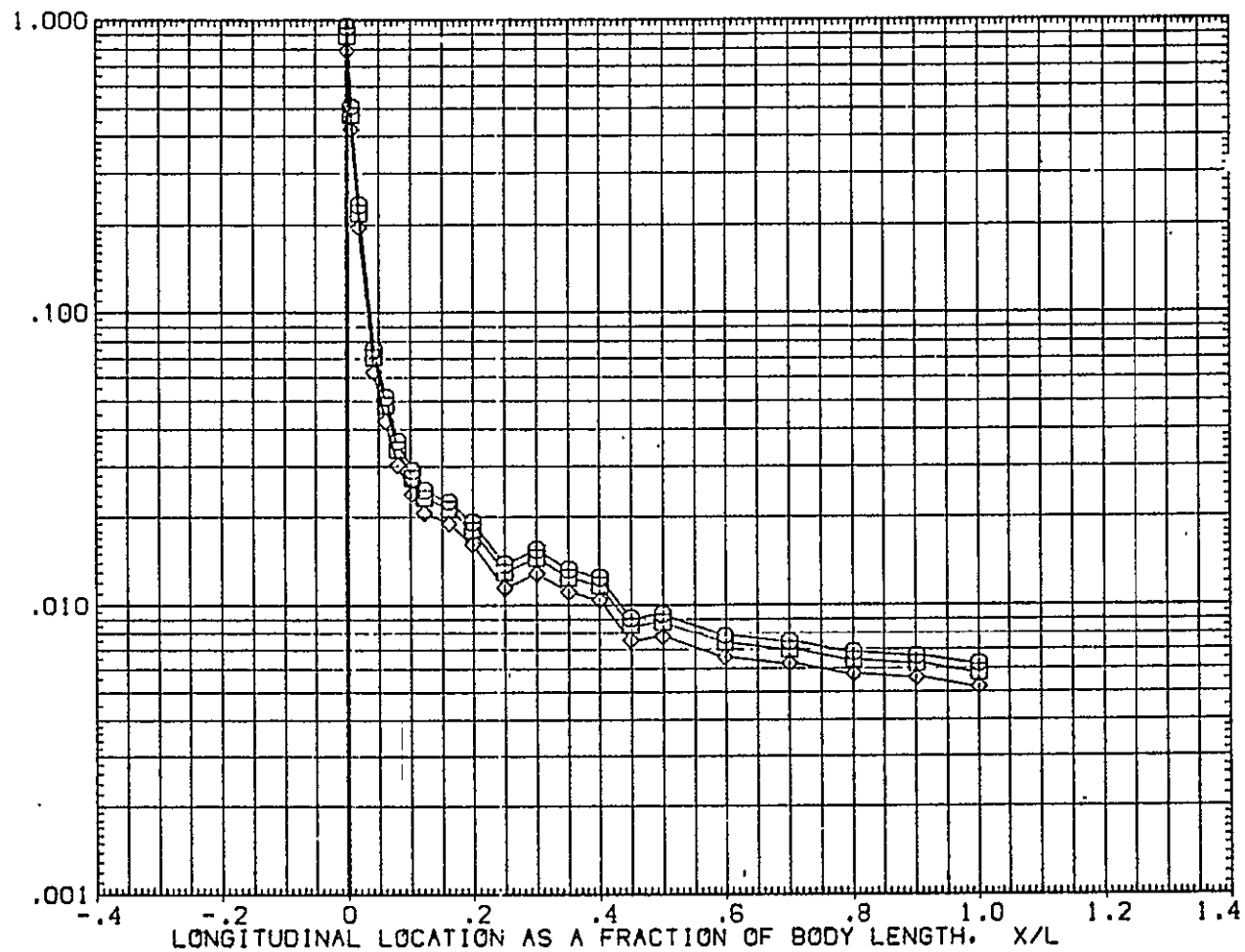


FIG. 8 EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER ALPHA = 0

OH12/IH21 (CAL HST 173-100) 37 0

FUSELAGE (RUGB07)

| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
|--------|--------|--------|--------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| ○ | .850 | 25.000 | 18.310 | .000 | | .000 |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

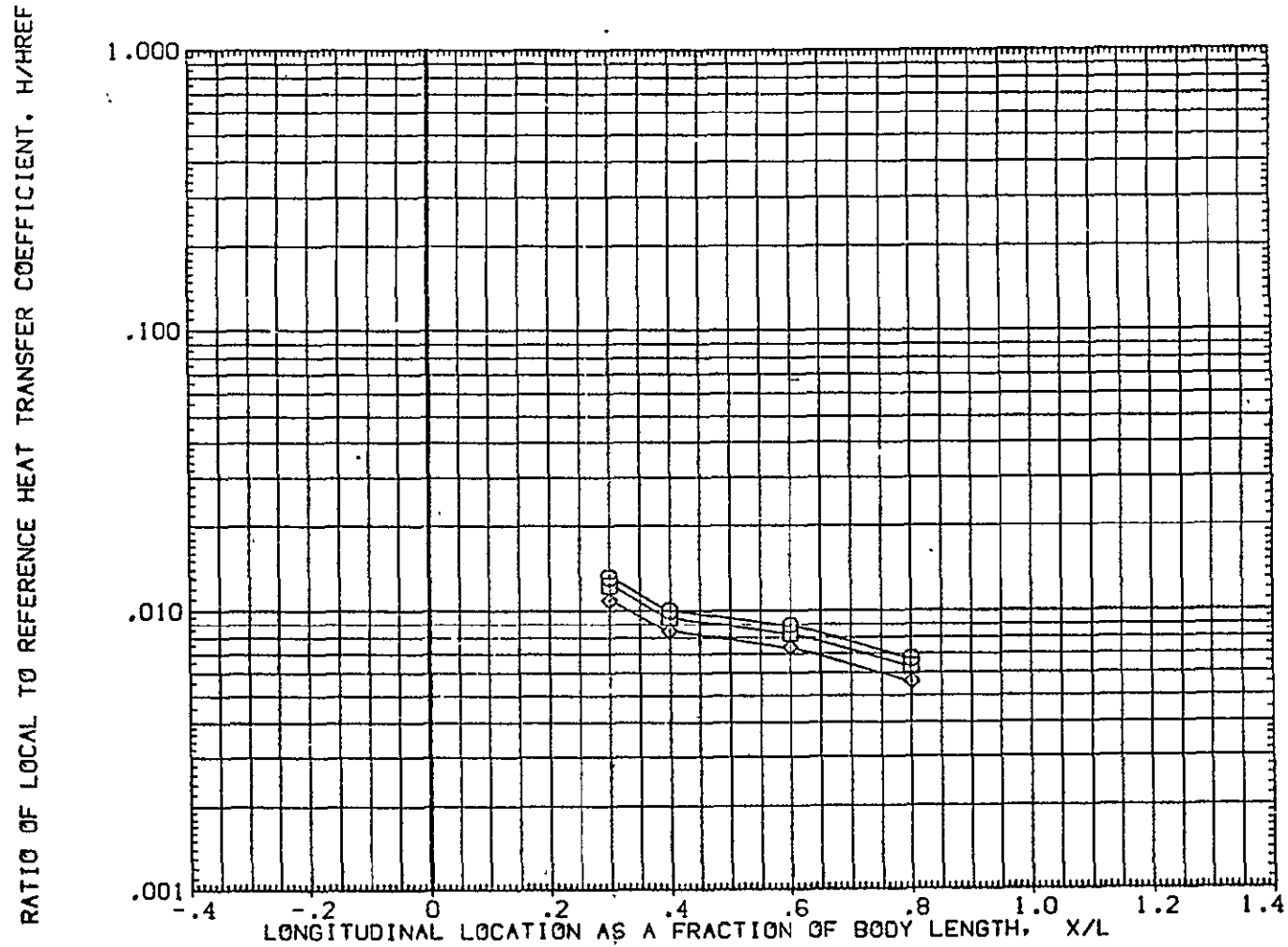


FIG. 8 EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER ALPHA = 0

OH12/IH21 (CAL HST 173-100) 37 0

FUSELAGE (RUGB07)

SYMBOL

HAW/HT

PHI

MACH

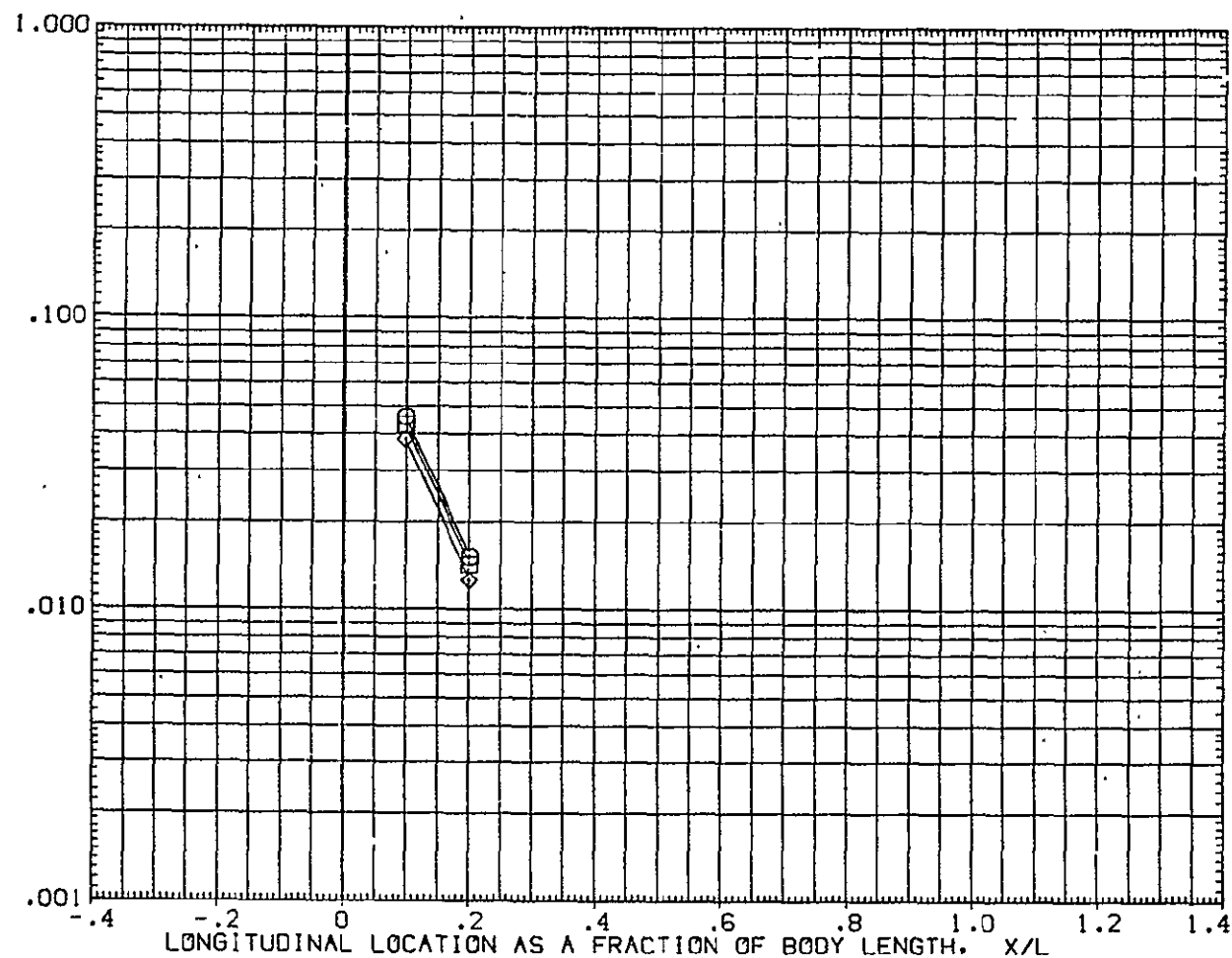
PARAMETRIC VALUES

ALPHA

.000

BETA

.000

◇
□
○.850
.900
1.000RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF} FIG. 8 EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER $\alpha = 0$

0H12/IH21 (CAL HST 173-100) 37 0

FUSELAGE (RUGB07)

| | | | | | | | |
|--------|--------|---------|--------|-------|-------------------|--|------|
| SYMBOL | HAW/HT | PHI | MACH | ALPHA | PARAMETRIC VALUES | | BETA |
| ◇ □ ○ | .850 | 180.000 | 18.310 | .000 | | | .000 |
| | .900 | | | | | | |
| | 1.000 | | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/HREF

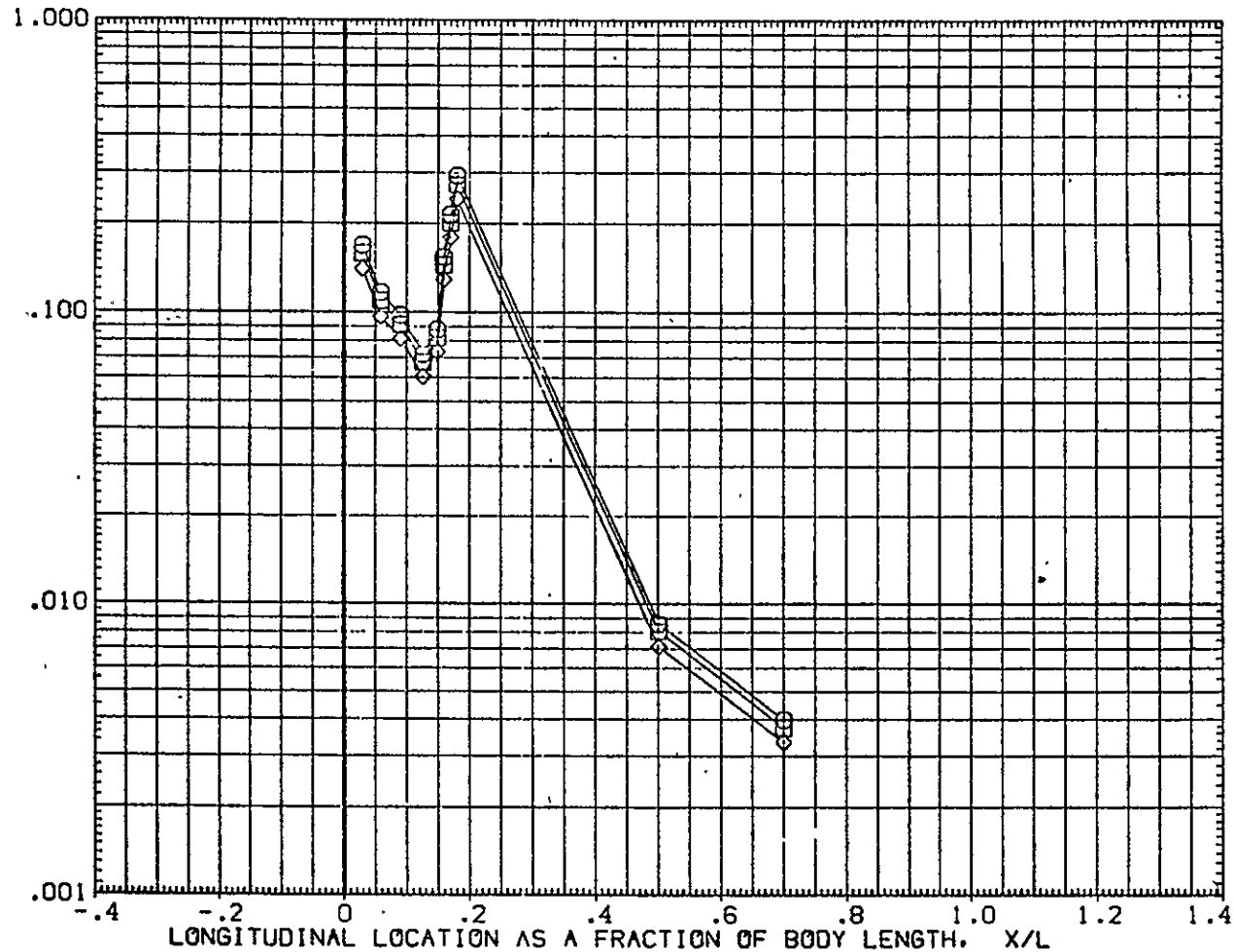
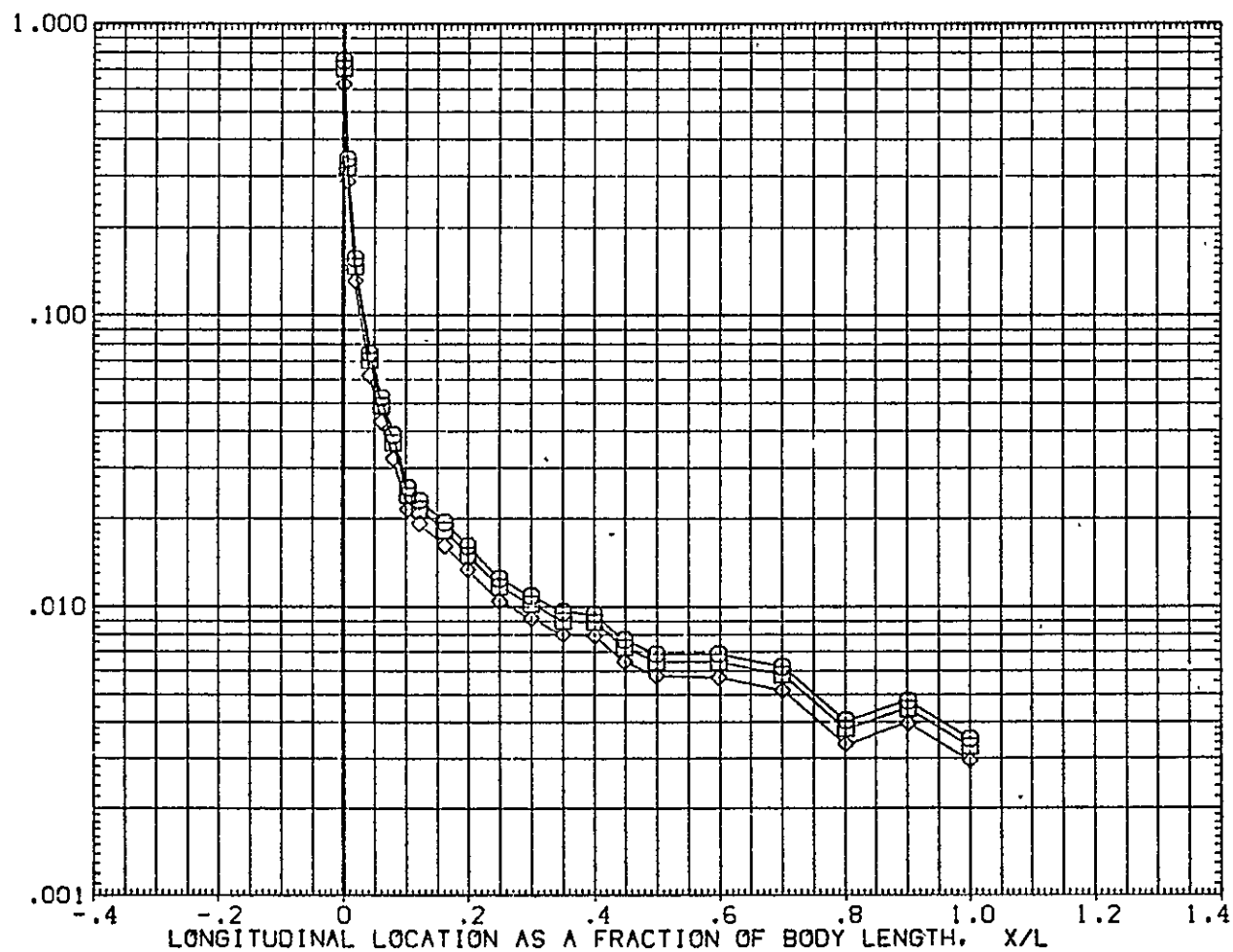


FIG. 8 EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER ALPHA = 0

OH12/IH21 (CAL HST 173-100) 37 0

FUSELAGE (RUGB07)

| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
|--------|--------|------|--------|-------------------|------|--|
| | | | | ALPHA | BETA | |
| ○ | .850 | .000 | 19.190 | | | |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF} FIG. 8 EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER $\alpha = 0$

OH12/IH21 (CAL HST 173-100) 37 0

FUSELAGE (RUGB07)

| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
|--------|--------|--------|--------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| ◇ | .850 | 25.000 | 19.190 | .000 | | .000 |
| □ | .900 | | | | | |
| ○ | 1.000 | | | | | |

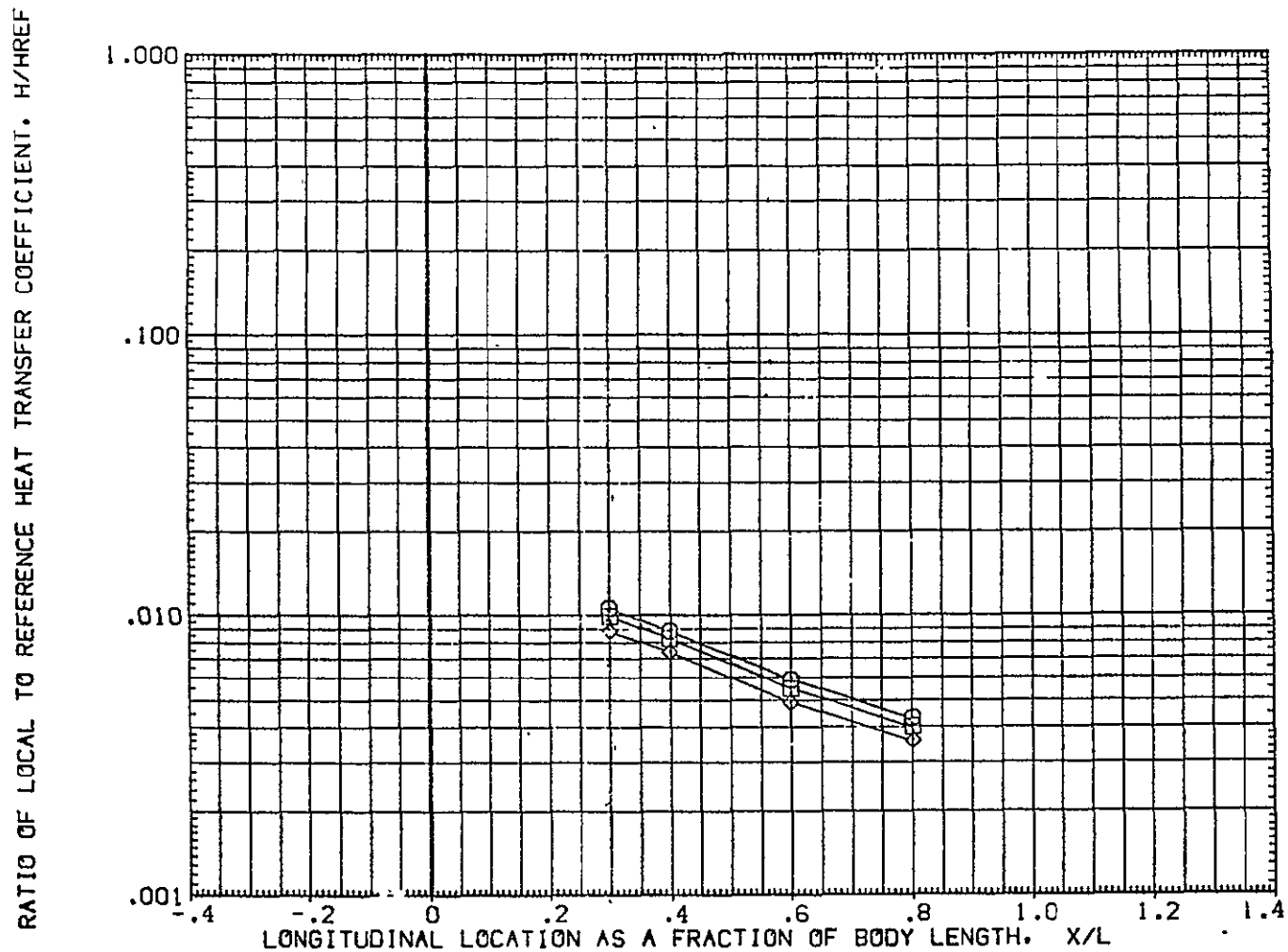


FIG. 8 EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER ALPHA = 0

0H12/1H21 (CAL HST 173-100) 37 0

FUSELAGE (RUGB07)

| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
|--------|--------|--------|--------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| ○ | .850 | 30.000 | 19.190 | .000 | | .000 |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

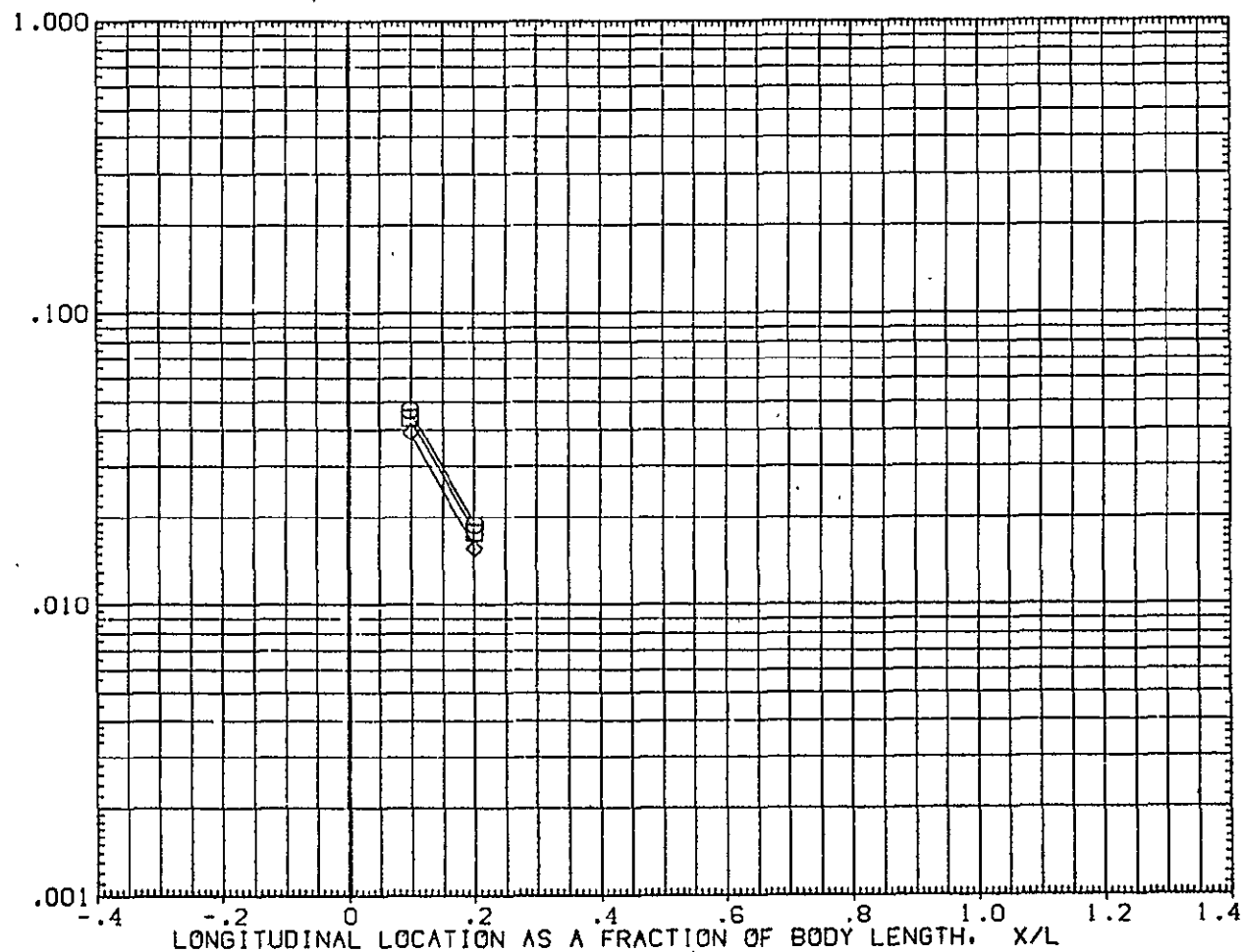


FIG. 8 EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER ALPHA = 0

CH12/IH21 (CAL HST 173-100) 37 0

FUSELAGE (RUGB07)

| SYMBOL | HAW/HT | PHI | MACH | ALPHA | PARAMETRIC VALUES | |
|--------|--------|---------|--------|-------|-------------------|------|
| ○ | .850 | 180.000 | 19.190 | | .00L | BETA |
| □ | .900 | | | | | .000 |
| ◇ | 1.000 | | | | | |

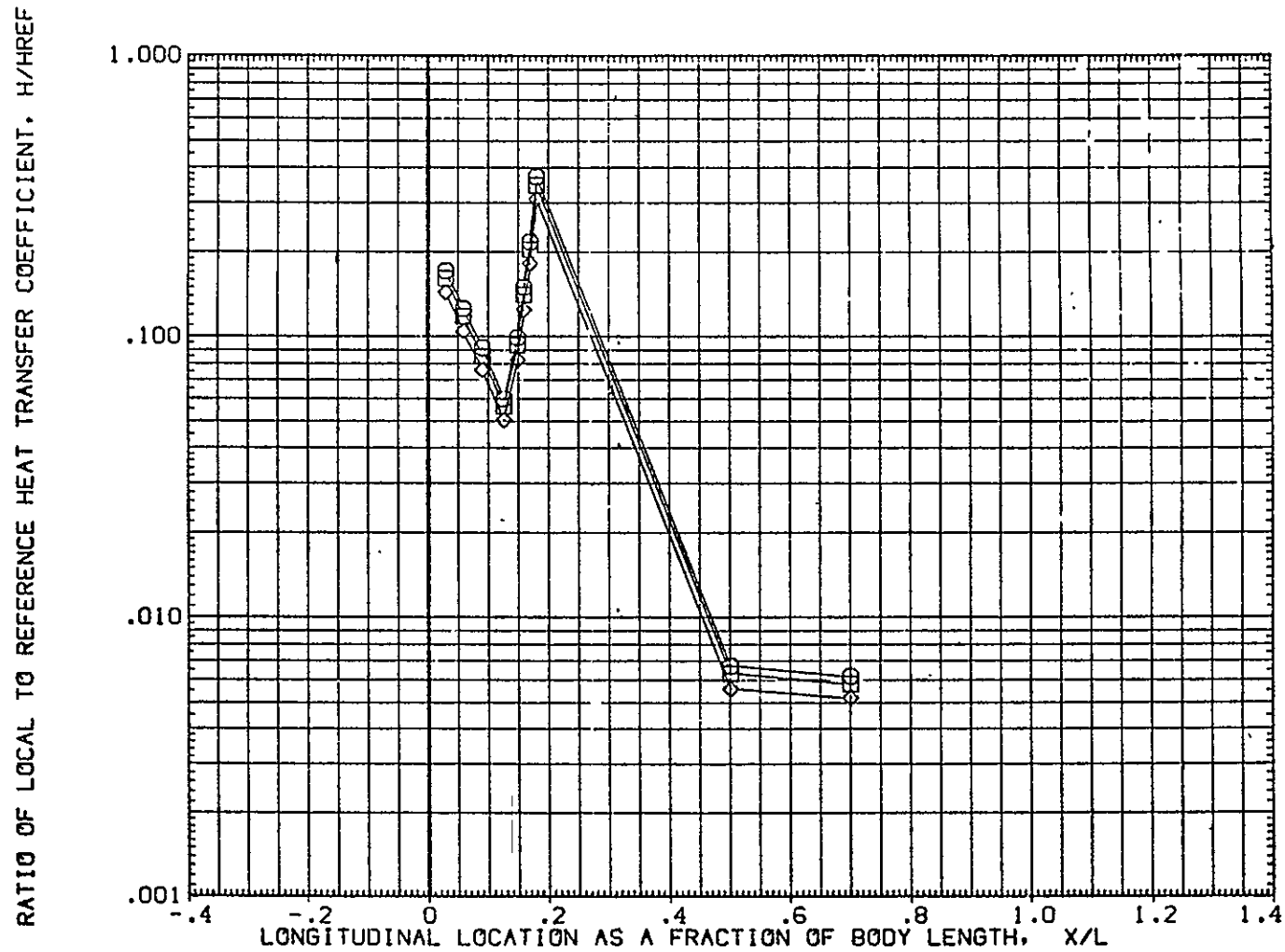


FIG. 8 EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER ALPHA = 0

OH12/IH21 (CAL HST 173-100) 37 0 T FUSELAGE (RUGB05)

| | | | | | | |
|--------|--------|------|-------|-------------------|------|-----------|
| SYMBOL | HAY/HT | PHI | MACH | PARAMETRIC VALUES | | |
| ○ | .850 | .000 | 6.999 | ALPHA | .000 | BETA .000 |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

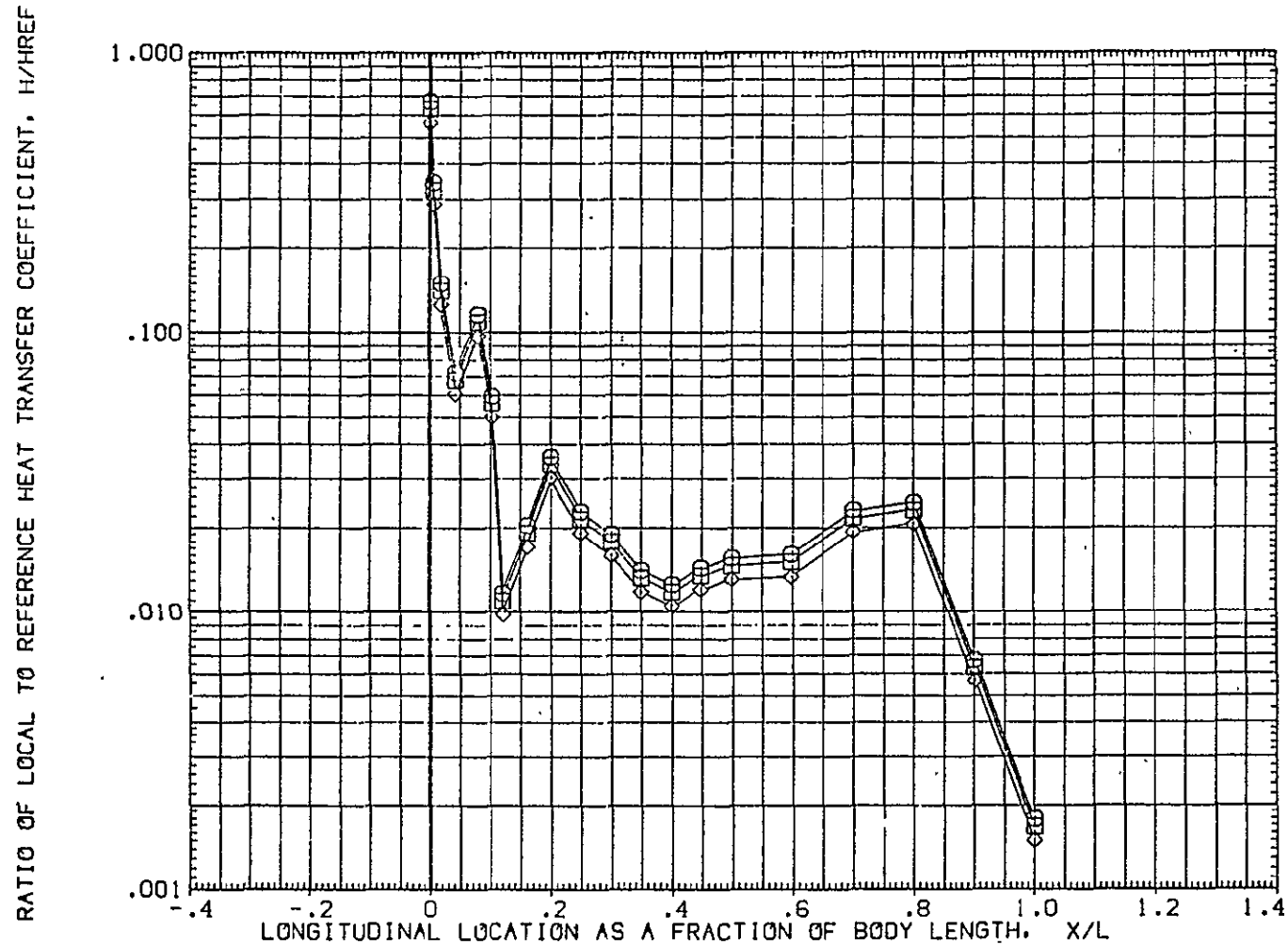


FIG. 8 EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER ALPHA = 0

OH12/IH21 (CAL HST 173-100) 37 0 T FUSELAGE (RUG805)

| | | | | | | |
|--------|--------|--------|-------|-------------------|------|------|
| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
| ○ | .850 | 25.000 | 6.999 | ALPHA | .000 | BETA |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | .000 |

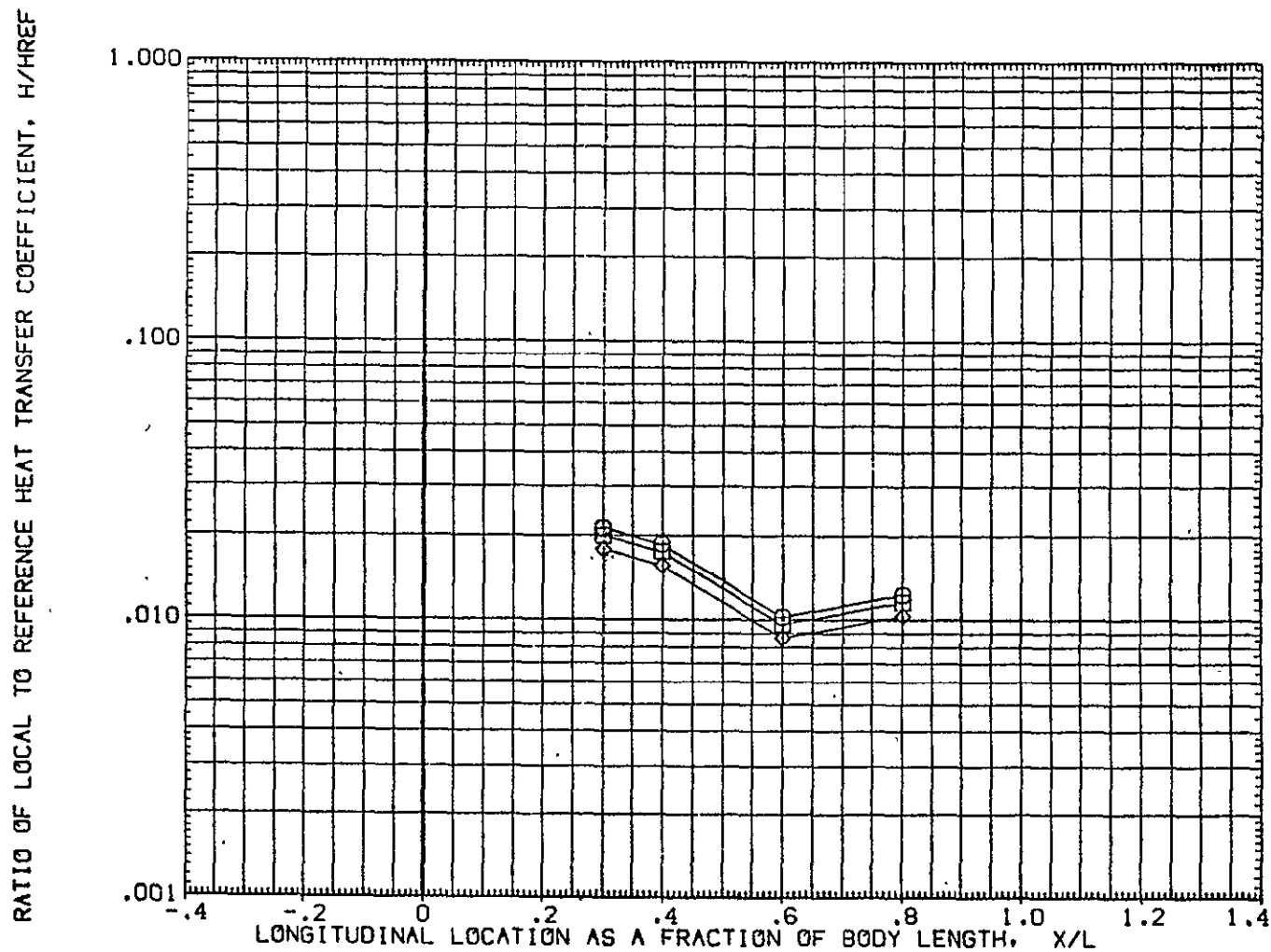


FIG. 8 EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER ALPHA = 0

OH12/IH21 (CAL HST 173-100) 37 0 T FUSELAGE (RUGB05)

| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
|--------|--------|--------|-------|-------------------|------|--|
| | | | | ALPHA | BETA | |
| ○ | .850 | 30.000 | 6.999 | .000 | | |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

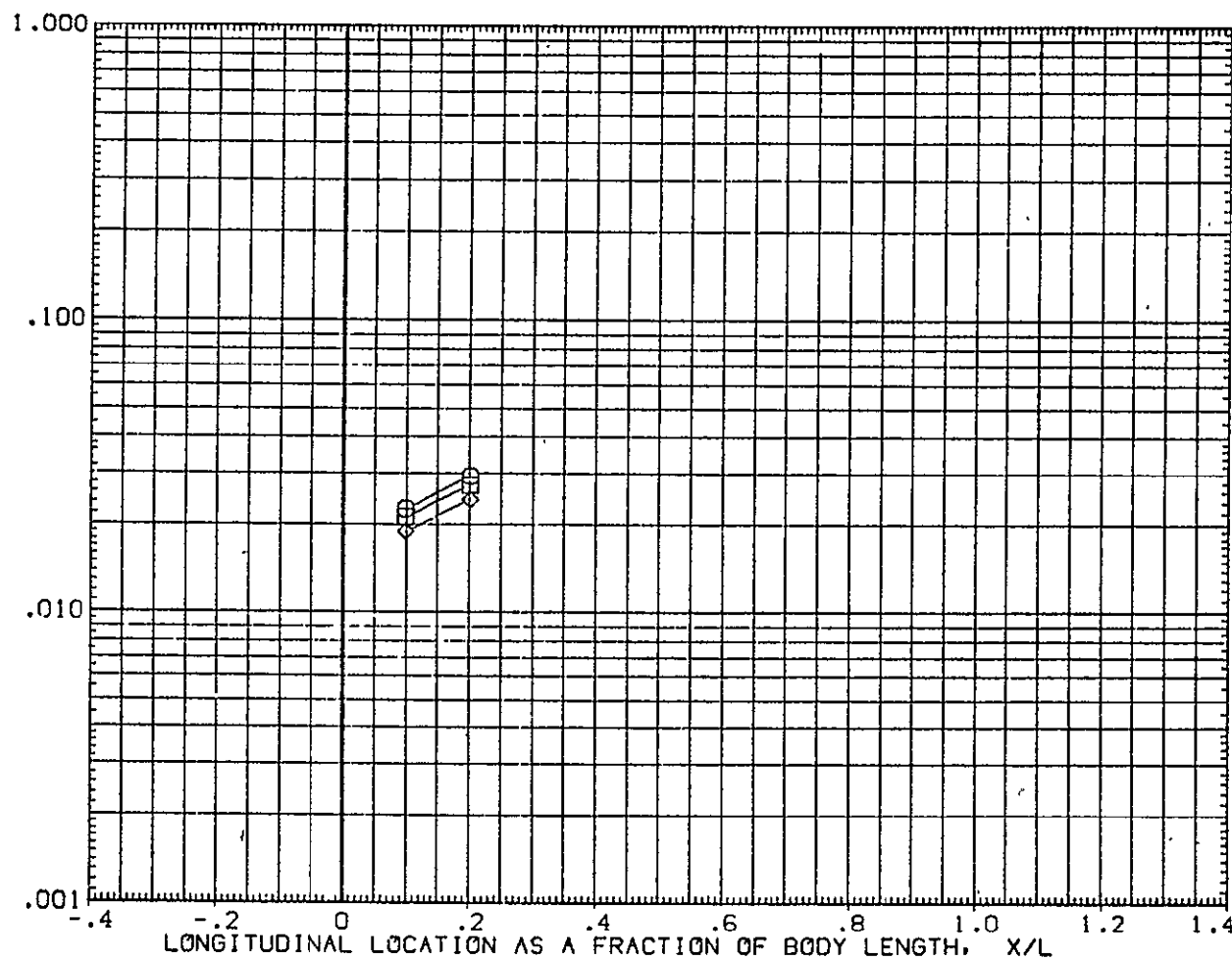


FIG. 8 EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER ALPHA = 0

REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR

0H12/IH21 (CAL HST 173-100) 37 0 T FUSELAGE (RUGB05)

| | | | | | | |
|--------|--------|---------|-------|-------------------|------|------|
| SYMBOL | RAY/HT | PHI | MACH | PARAMETRIC VALUES | | |
| ◇ | .850 | 180.000 | 6.999 | ALPHA | .000 | BETA |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | .000 |

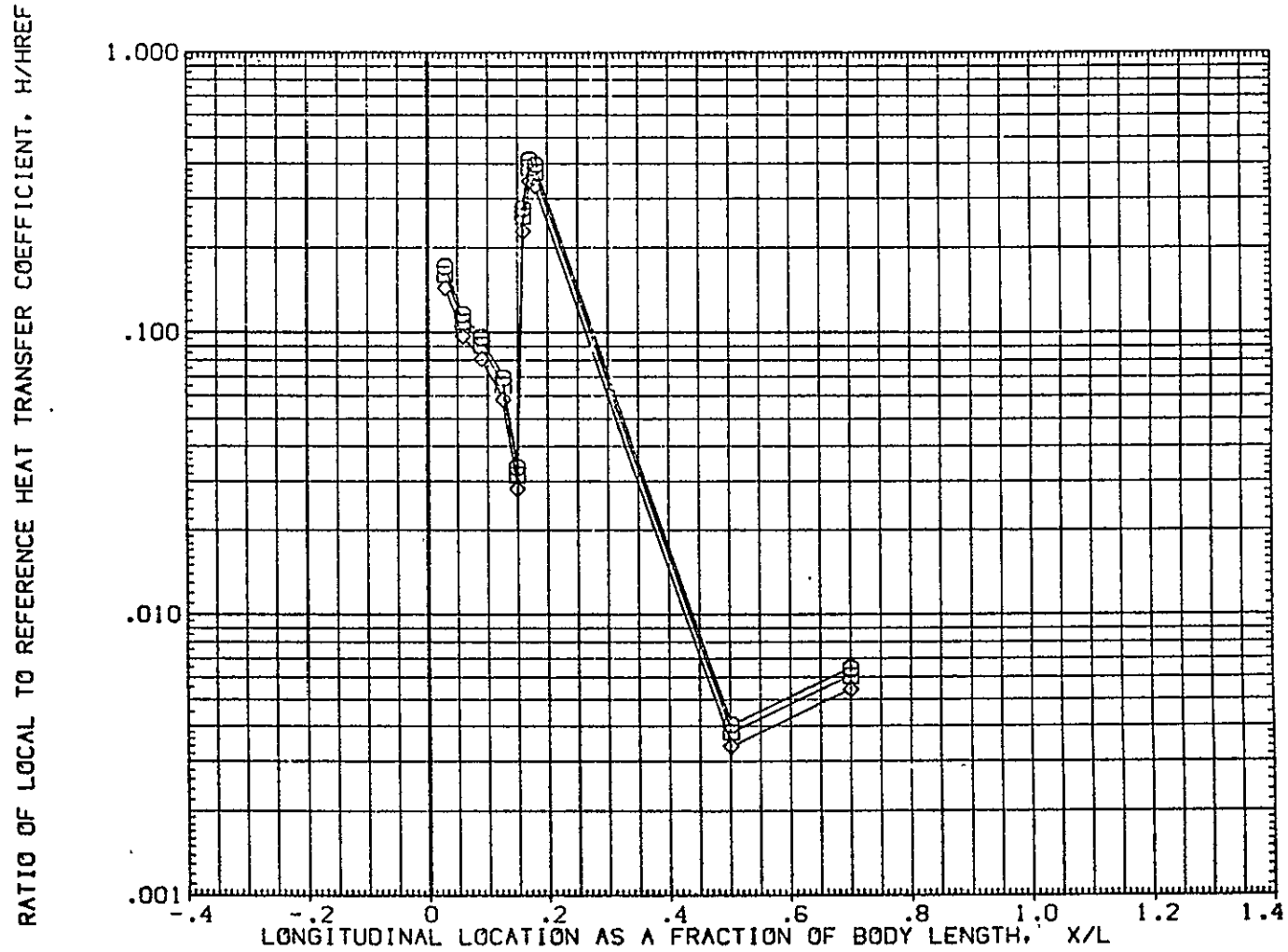


FIG. 8. EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER $\alpha = 0$

0H12/1H21 (CAL HST 173-100) 37 0 T FUSELAGE (RUGB05)

| | | | | | | |
|--------|--------|------|-------|-------------------|------|------|
| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
| ○ | .850 | .000 | 7.616 | ALPHA | .000 | BETA |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

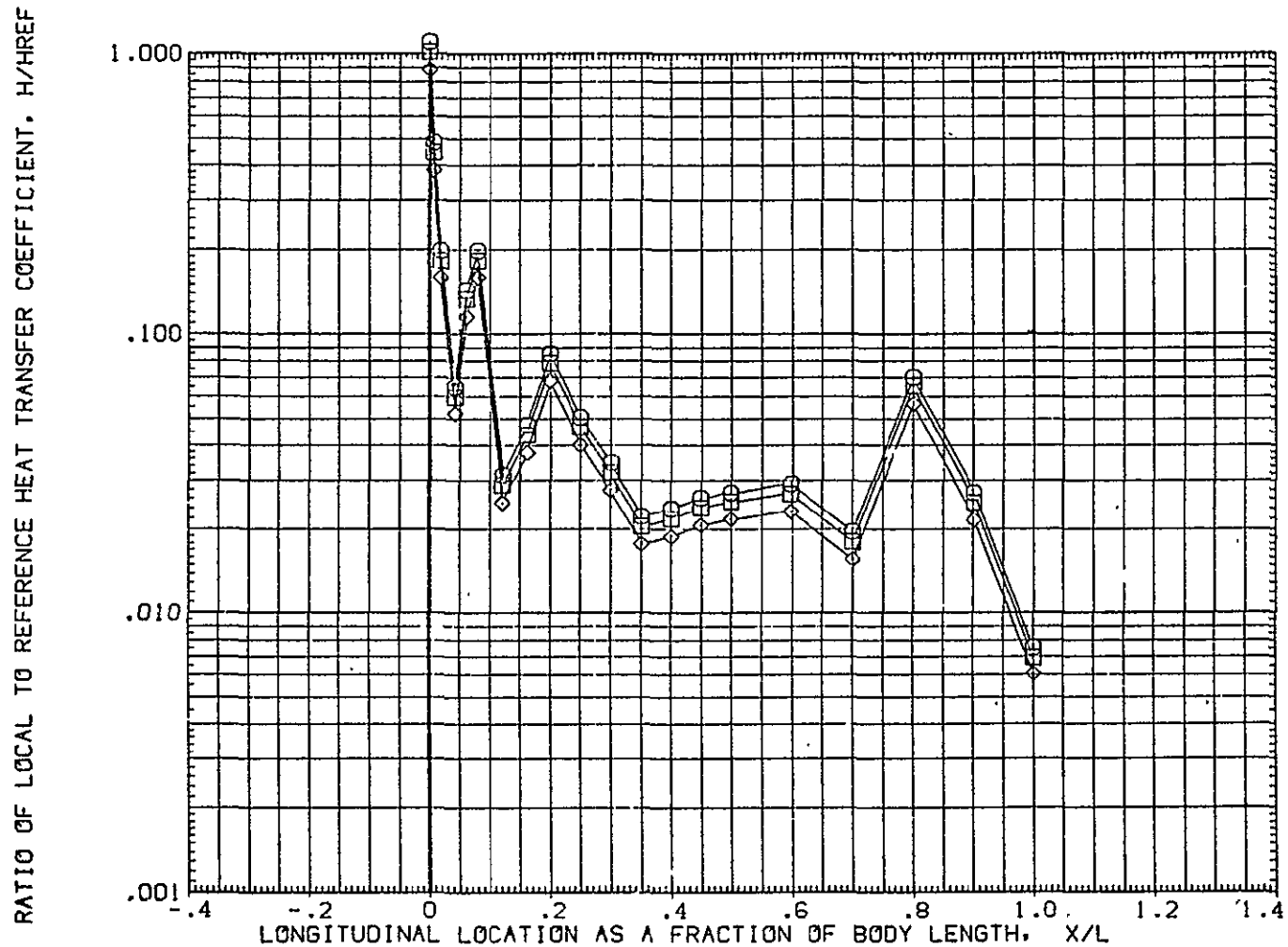


FIG. 8 EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER ALPHA = 0

0H12/1H21 (CAL HST 173-100) 37 0 T FUSELAGE (RUGB05)

| | | | | | | |
|--------|--------|--------|-------|-------------------|------|------|
| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
| □ | .850 | 25.000 | 7.616 | ALPHA, | .000 | BETA |
| ◇ | 1.000 | | | | | .000 |

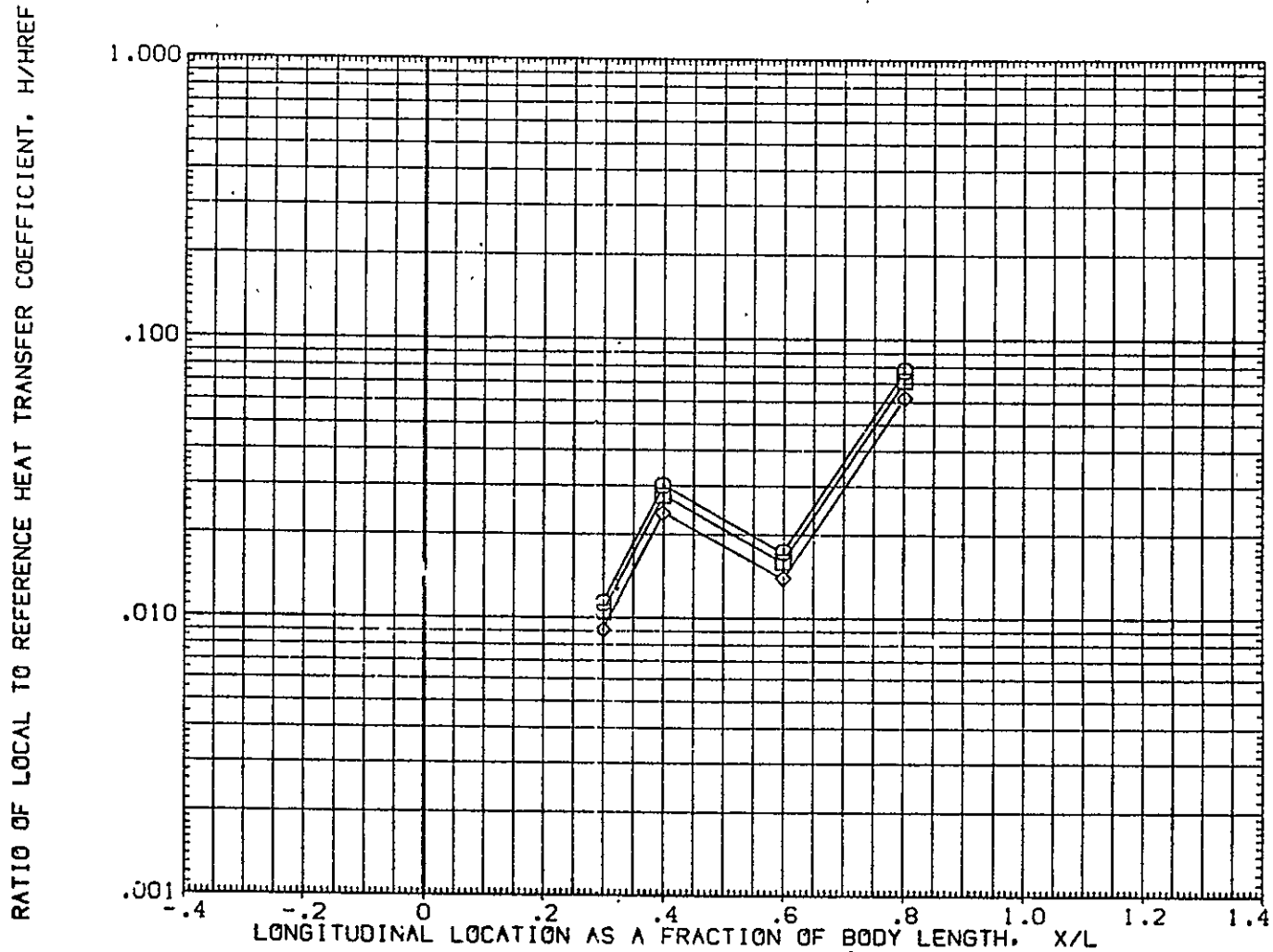


FIG. 8 EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER $\alpha = 0$

0H12/1H21 (CAL HST 173-100) 37 0 T FUSELAGE (RUGB05)

| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
|--------|--------|--------|-------|-------------------|------|--|
| | | | | ALPHA | BETA | |
| ○ | .850 | 30.000 | 7.616 | .000 | .000 | |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

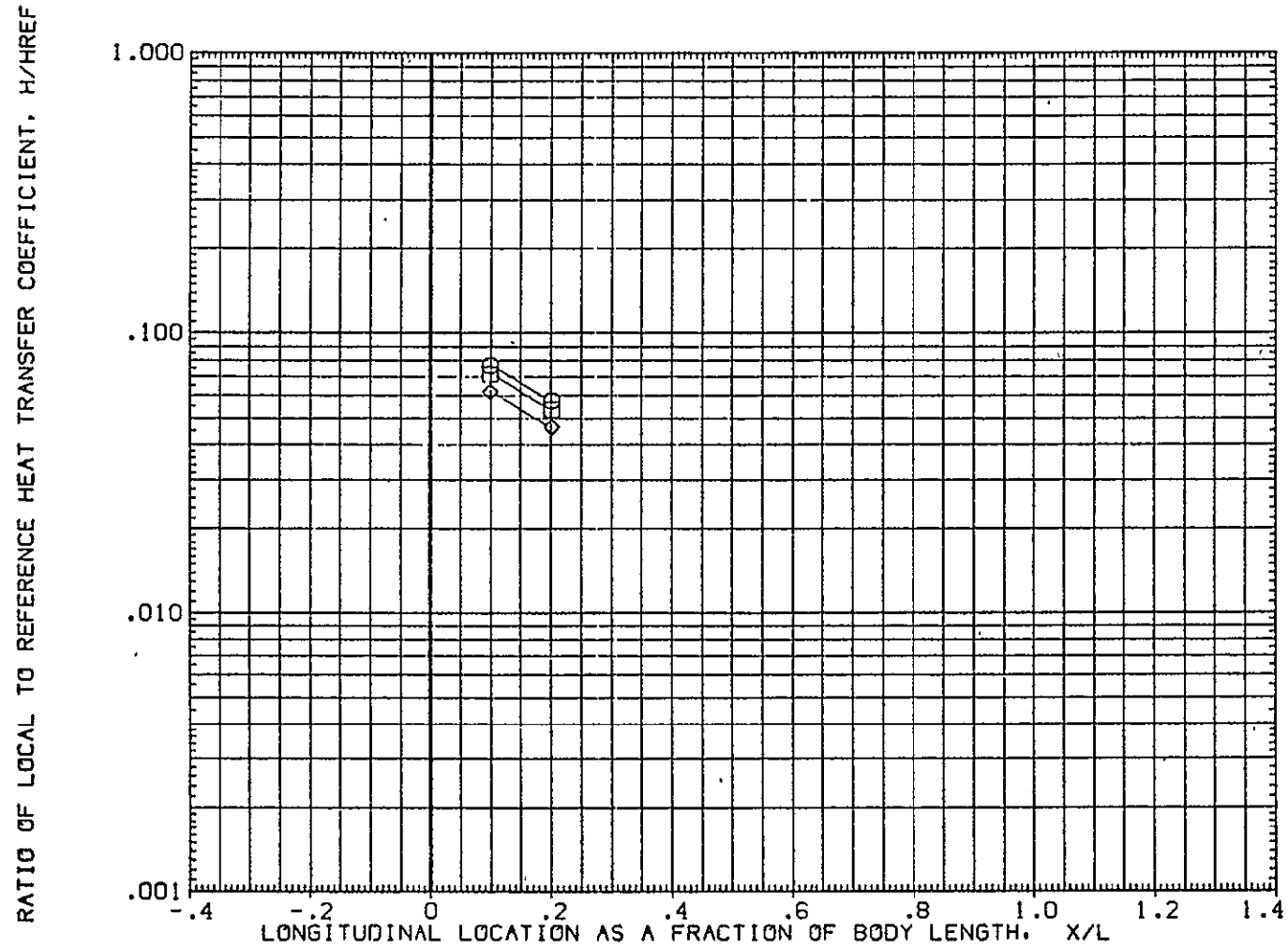


FIG. 8 EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER $\alpha = 0$

0H12/1H21 (CAL HST 173-100) 37 0 T FUSELAGE (RUGB05)

| SYMBOL | HAY/HT | PHI | MACH | ALPHA | PARAMETRIC VALUES | |
|--------|--------|---------|-------|-------|-------------------|------|
| ○ | .850 | 180.000 | 7.616 | .000 | BETA | .000 |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

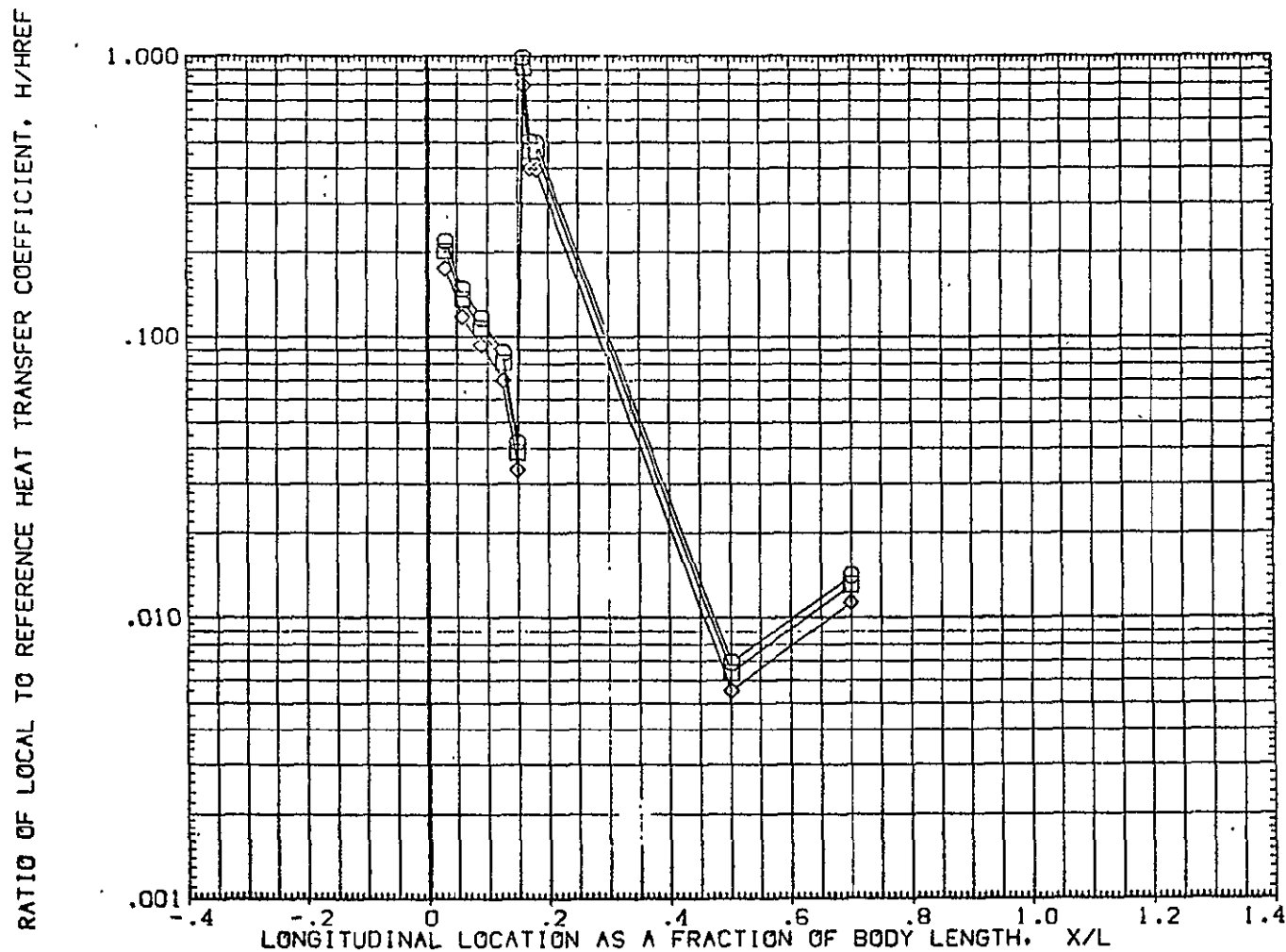


FIG. 8 EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER $\alpha = 0$

OH12/IH21 (CAL HST 173-100) 37 0 T FUSELAGE (RUGB05)

| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
|--------|--------|------|--------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| ◇ | .850 | .000 | 18.330 | .000 | .000 | .000 |
| □ | .900 | | | | | |
| ○ | 1.000 | | | | | |

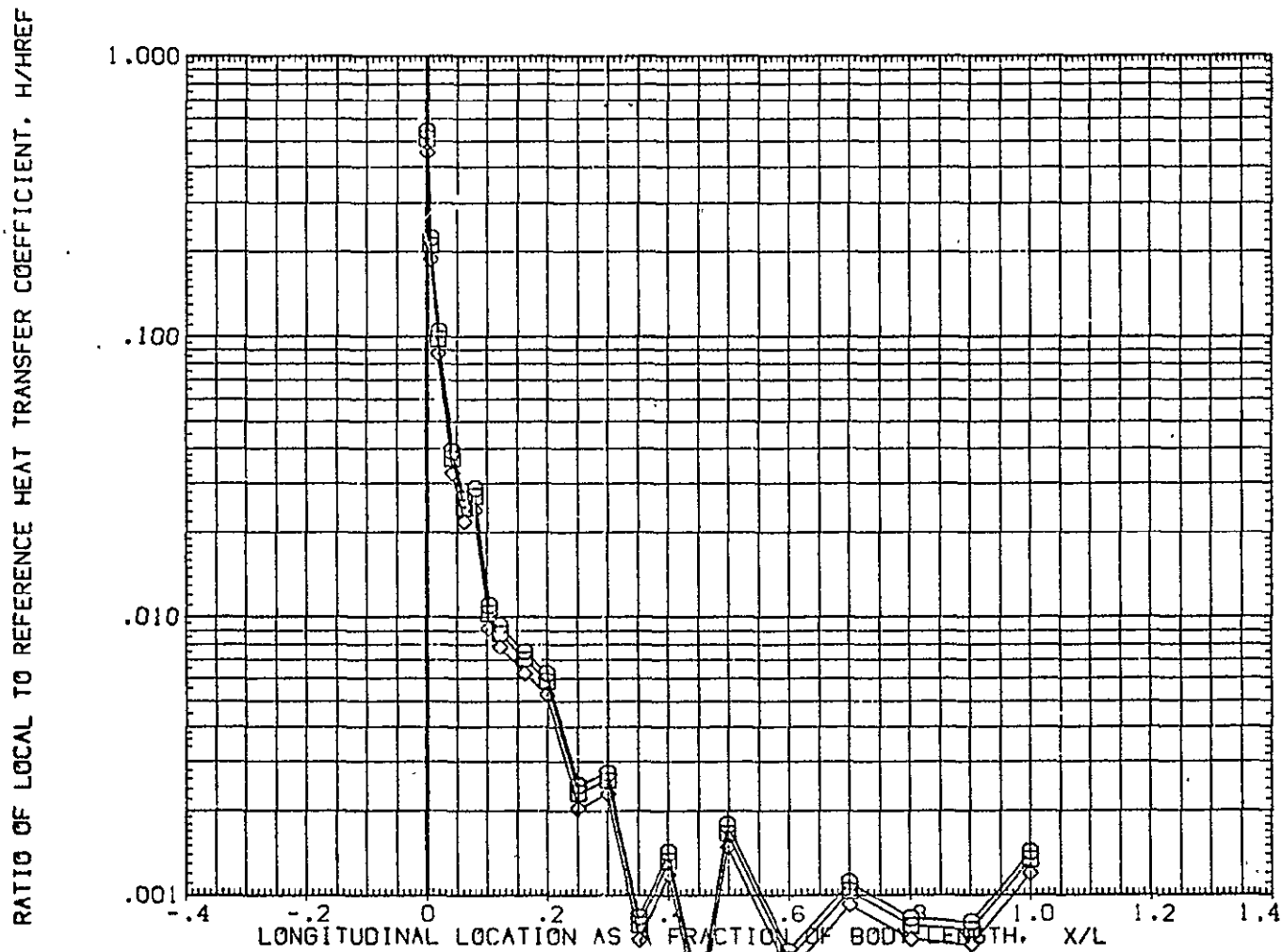


FIG. 8 EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER $\alpha = 0$

OH12/IH21 (CAL HST 173-100) 37 0 T FUSELAGE (RUGB05)

| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
|--------|--------|--------|--------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| ○ | .850 | 25.000 | 18.330 | .000 | .000 | .000 |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

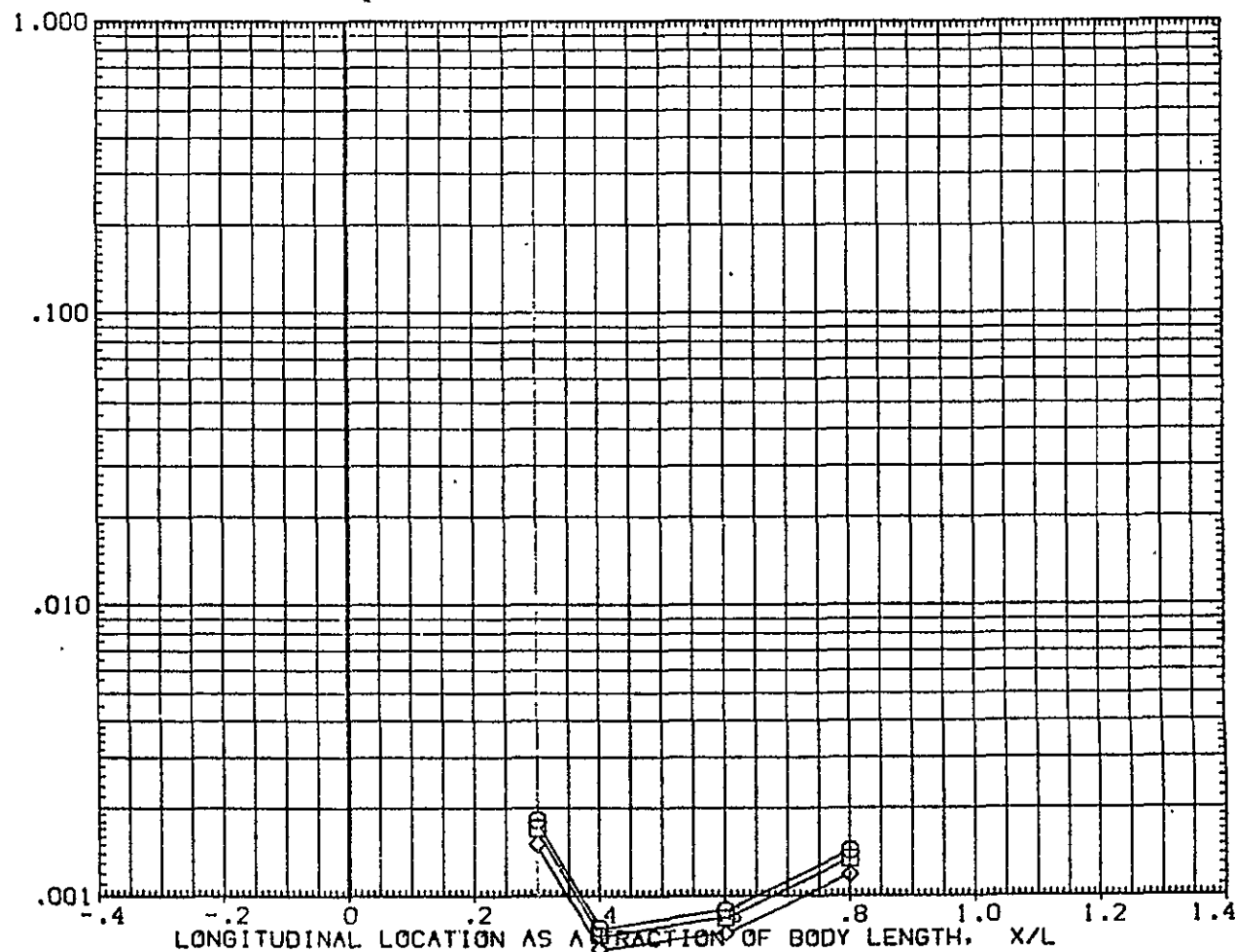


FIG. 8 EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER $\alpha = 0$

0H12/1H21 (CAL HST 173-100) 37 0 T FUSELAGE (RUGB05)

| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
|--------|--------|--------|--------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| ◇ | .850 | 30.000 | 18.330 | .000 | | .000 |
| ◇ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

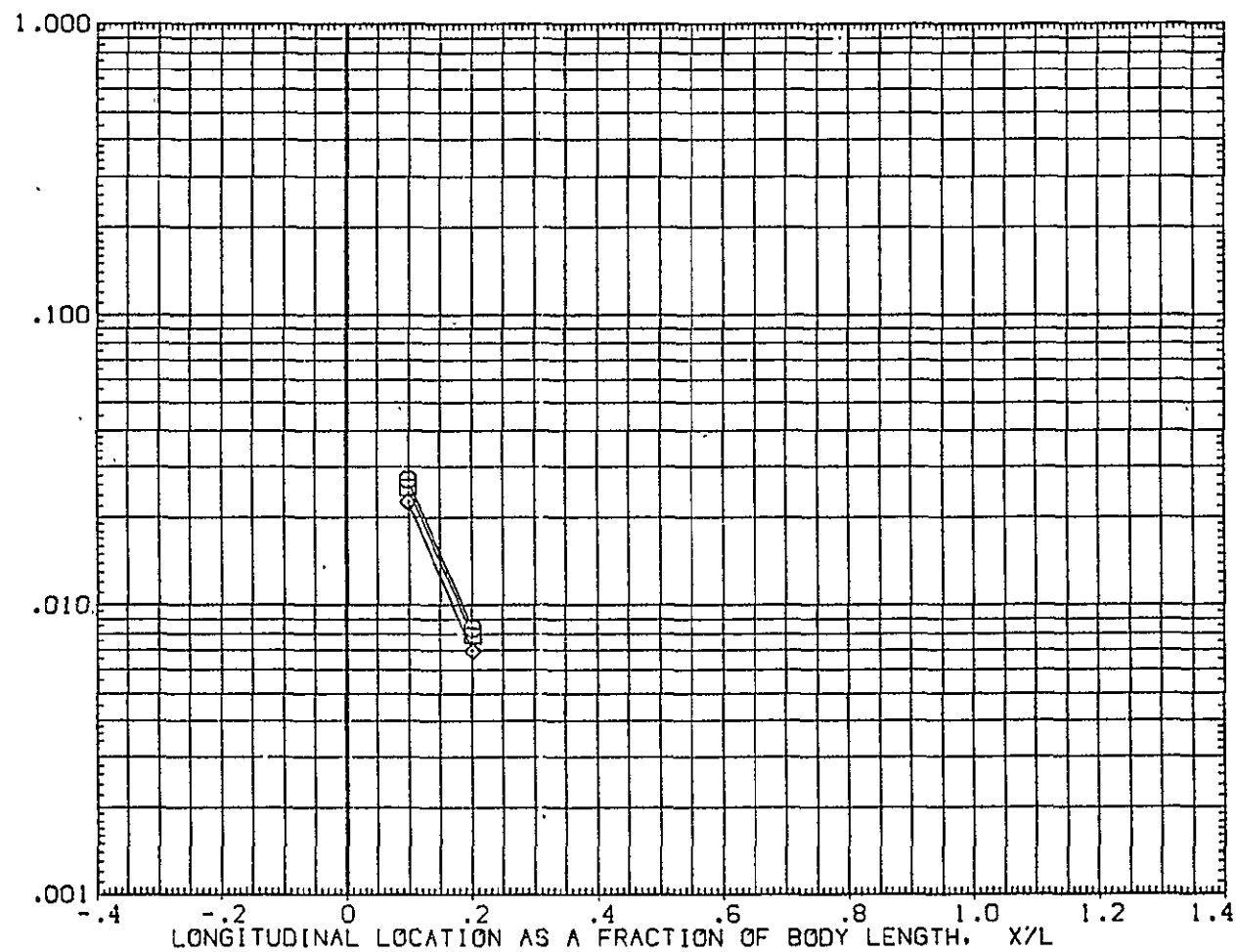


FIG. 8 EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER ALPHA = 0

REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR.

OH12/IH21 (CAL HST 173-100) 37 0 T FUSELAGE (RUGB05)

| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
|--------|--------|---------|--------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| ○ | .850 | 180.000 | 18.330 | .000 | .000 | .000 |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

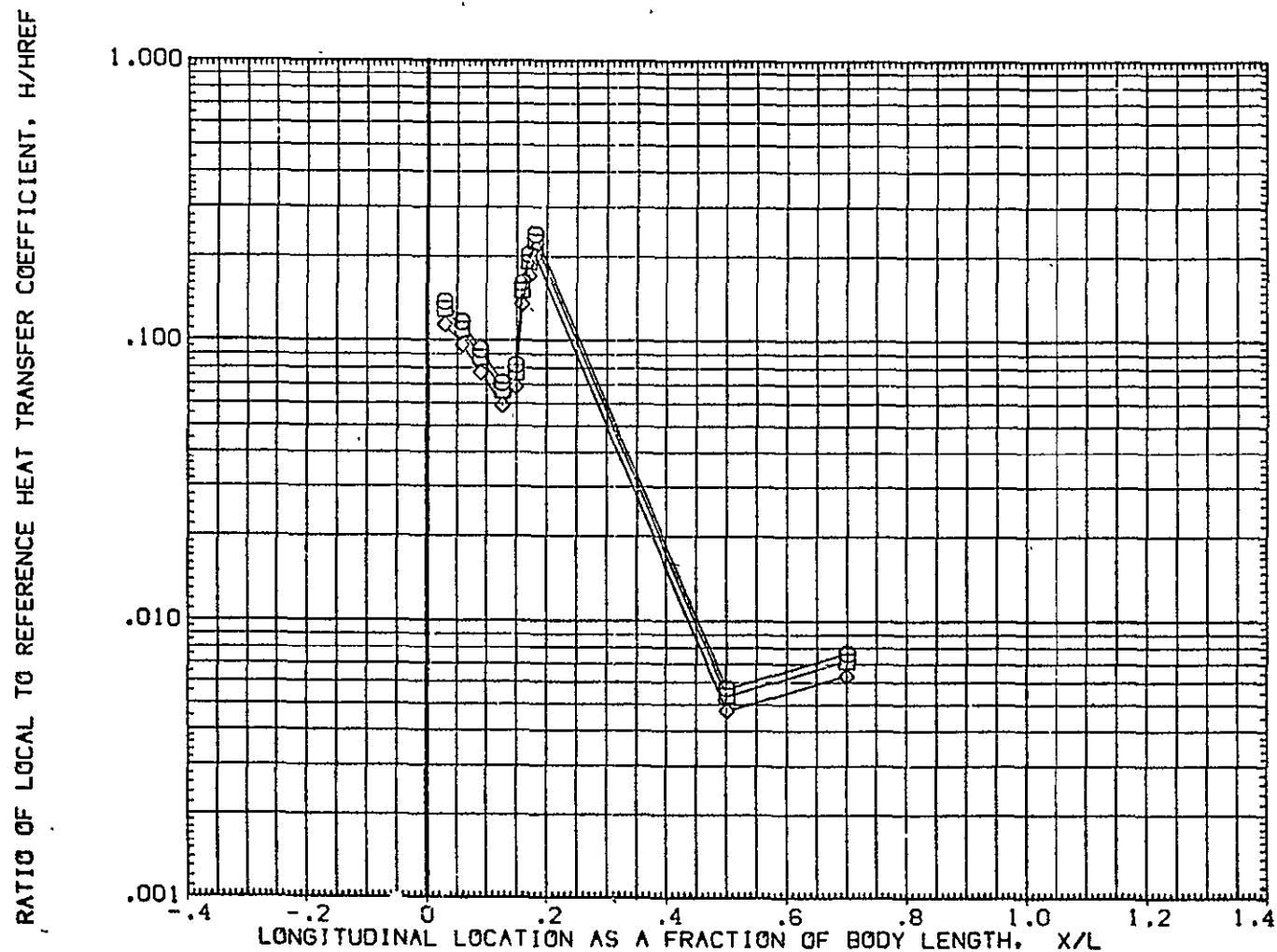


FIG. 8 EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER $\alpha = 0$

OH12/IH21 (CAL HST 173-100) 37 0 T FUSELAGE (RUGB05)

| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
|--------|--------|------|--------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| ○ | .850 | .000 | 19.200 | .000 | .000 | .000 |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, h/h_{REF}

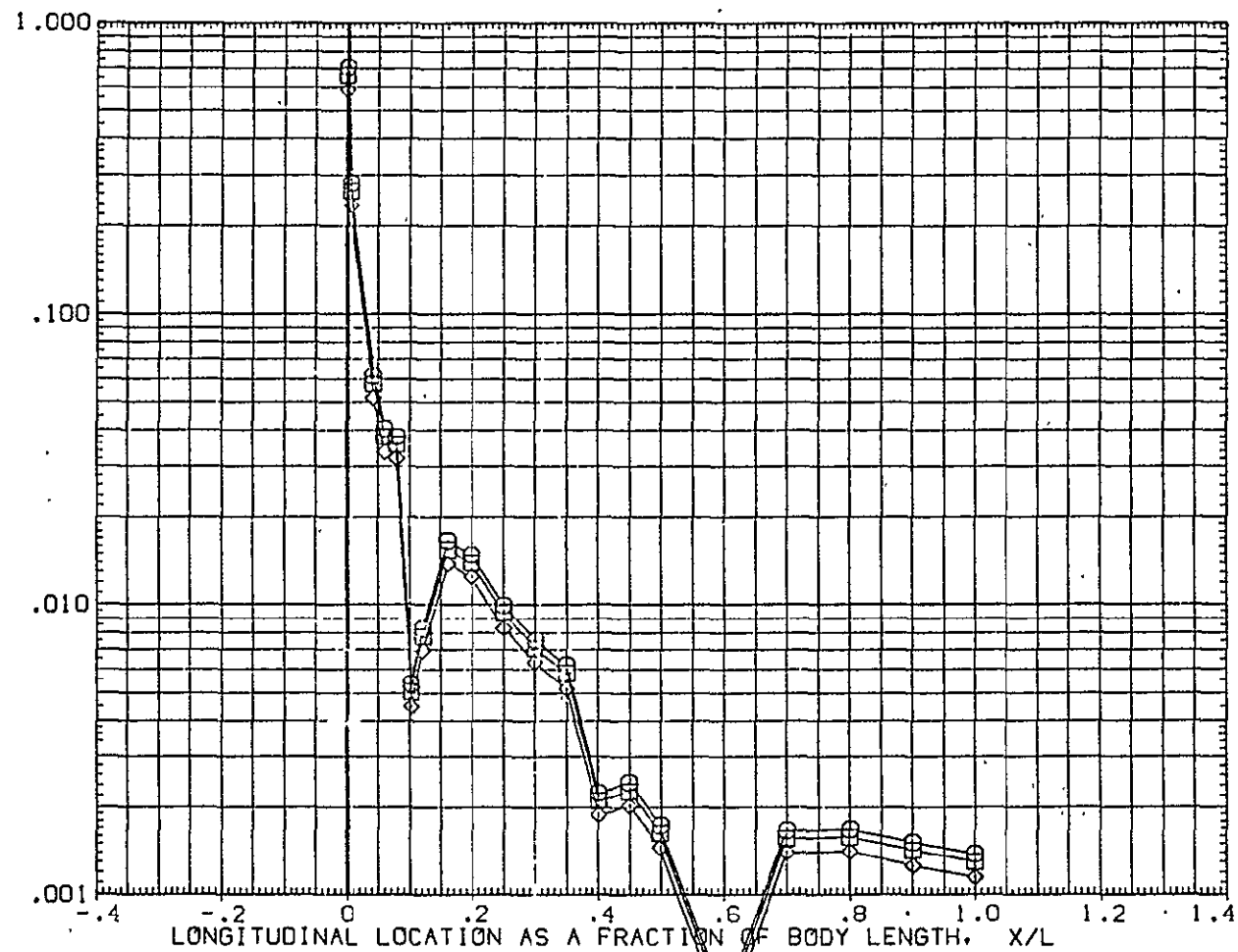


FIG. 8 EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER $\alpha = 0$

OH12/IH21 (CAL HST 173-100) 37 0 T FUSELAGE (RUGB05)

| SYMBOL | HAW/HT | PHI | MACH | ALPHA | PARAMETRIC VALUES | |
|--------|--------|--------|--------|-------|-------------------|------|
| ○ | .850 | 25.000 | 19.200 | .000 | BETA | .000 |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

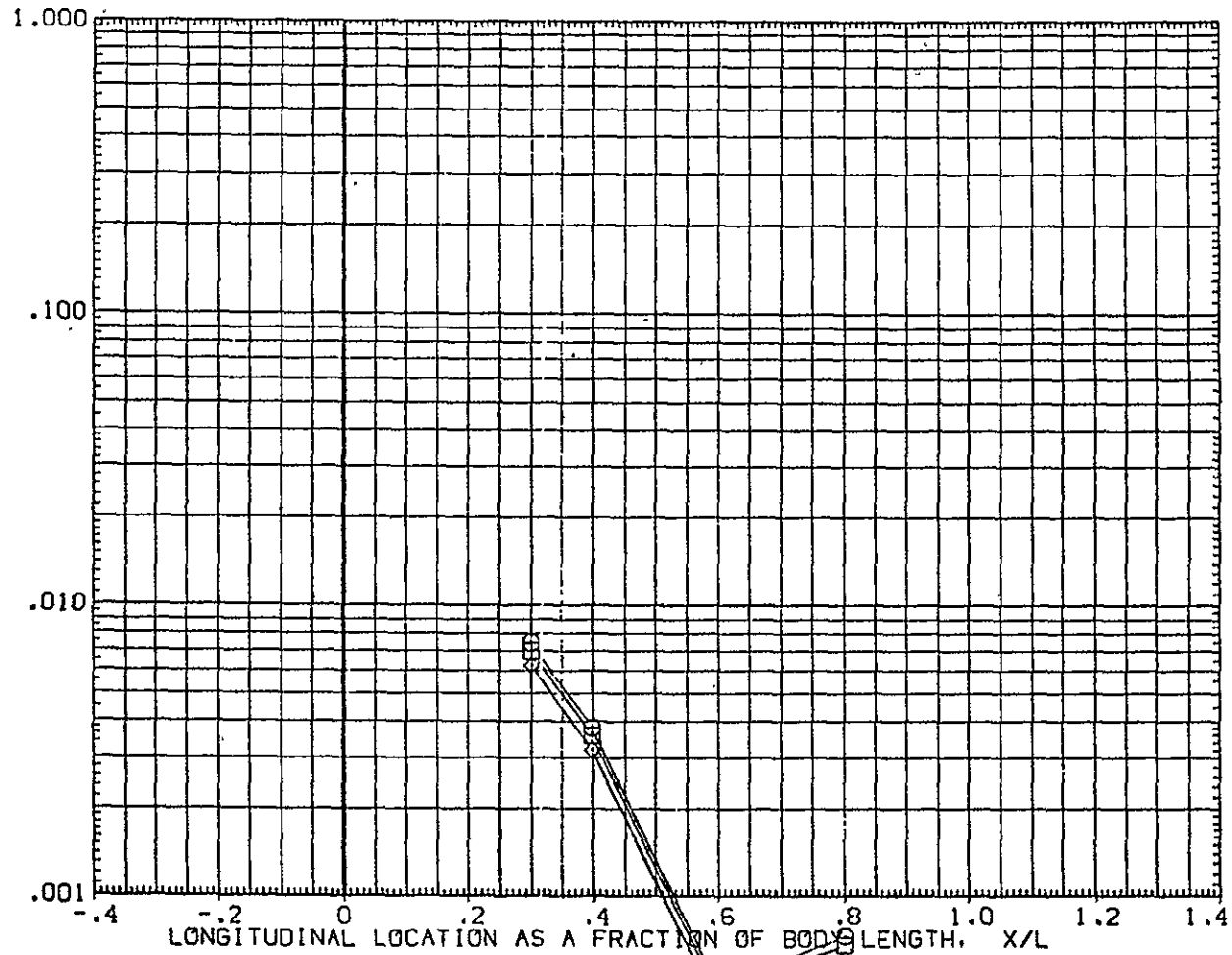


FIG. 8 EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER ALPHA = 0

0H12/IH21 (CAL HST I73-100) 37 0 T FUSELAGE (RUGB05)

| SYMBOL | HAW/HT | PHI | MACH | ALPHA | PARAMETRIC VALUES | | BETA | |
|--------|--------|--------|--------|-------|-------------------|--|------|------|
| ◇ | .850 | 30.000 | 19.200 | | .000 | | | .000 |
| □ | .900 | | | | | | | |
| ◇ | 1.000 | | | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

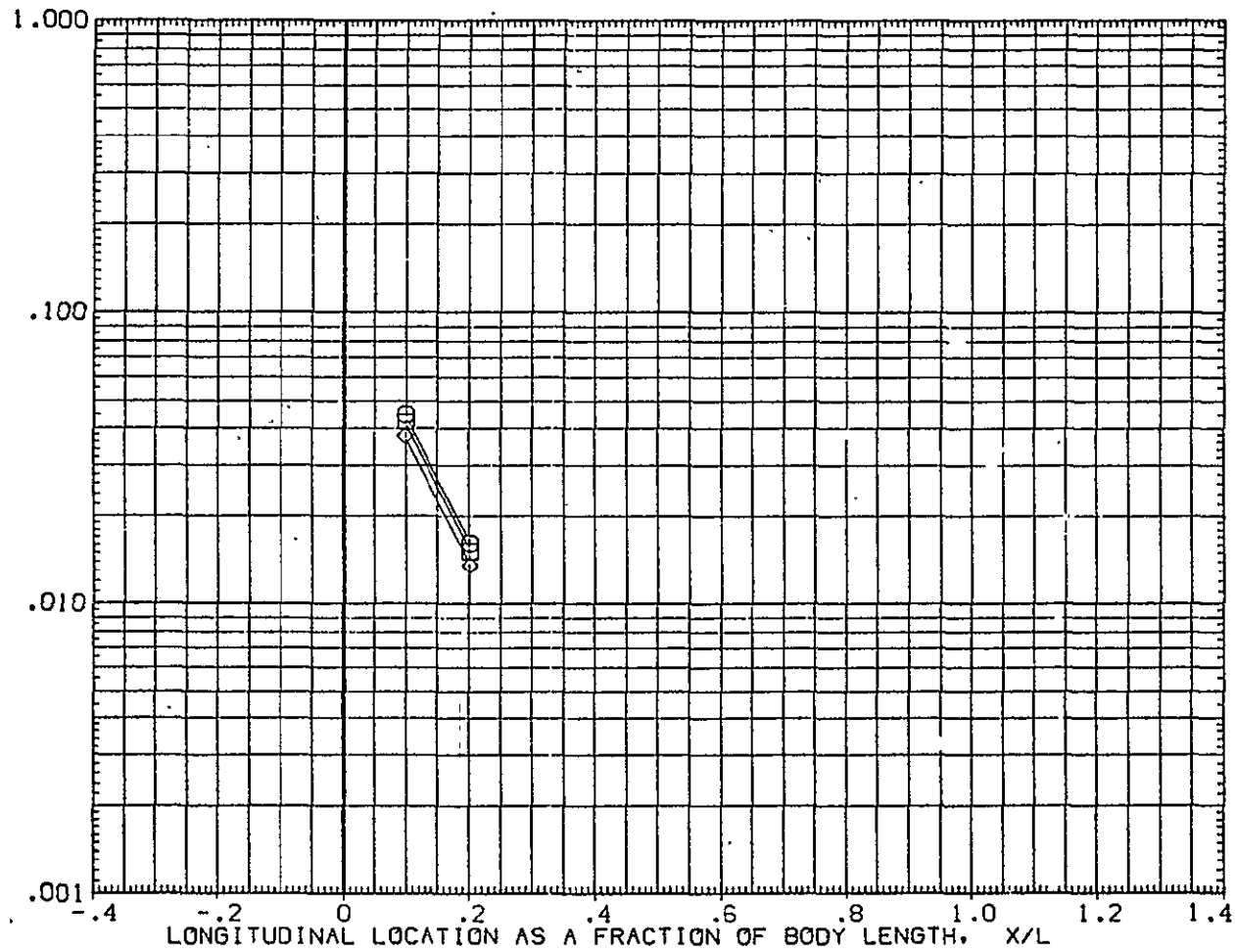


FIG. 8 EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER $\alpha = 0$

0H12/IH21 (CAL HST 173-100) 37 0 T FUSELAGE (RUGB05)

| | | | | | | |
|--------|--------|---------|--------|-------------------|------|------|
| SYMBOL | HAU/HT | PHI | MACH | PARAMETRIC VALUES | | |
| ○ | .850 | 180.000 | 19.200 | ALPHA | .000 | BETA |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

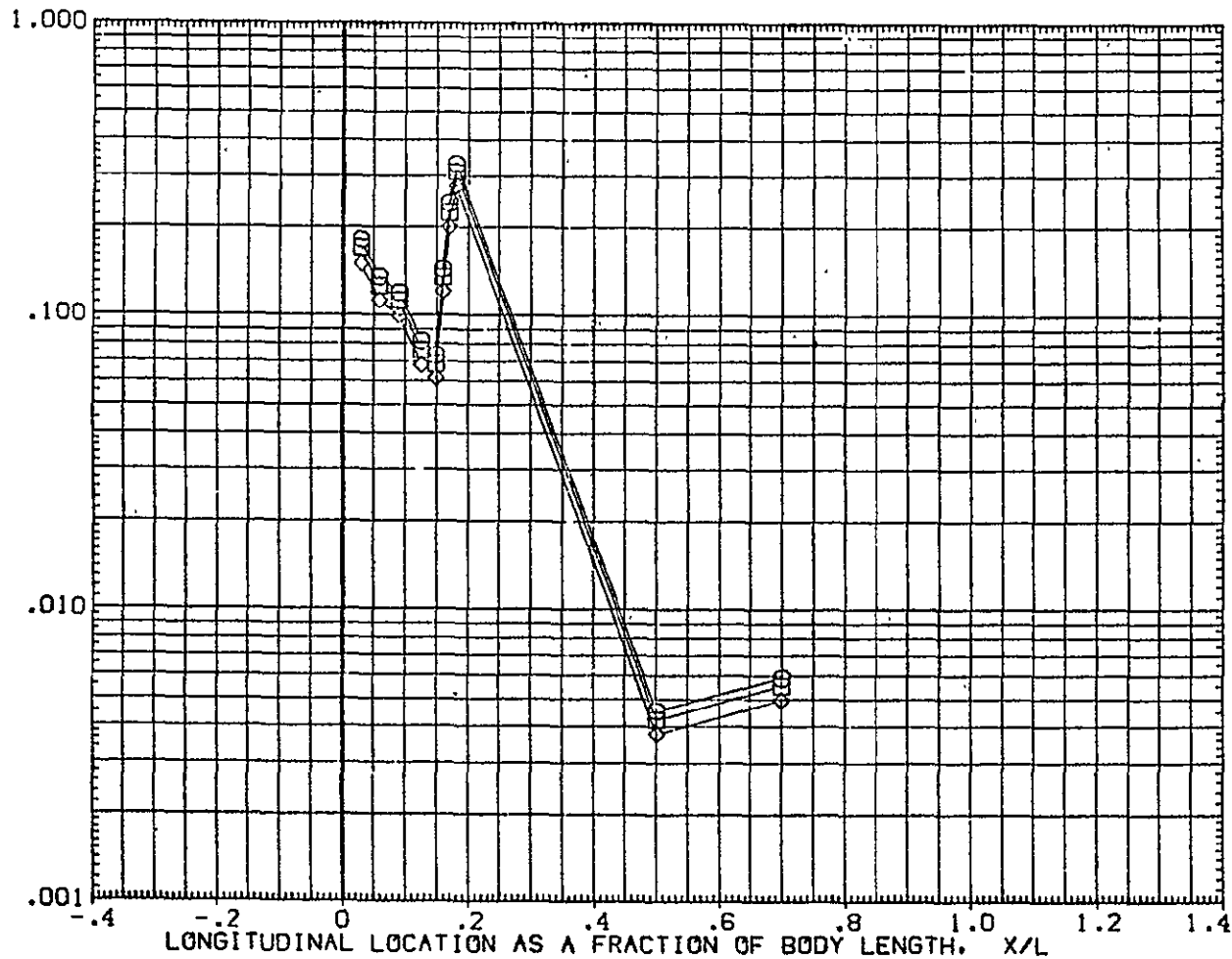


FIG. 8 EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER ALPHA = 0

OH12 + IH21 MODEL 37 OT(05)/0(07) FUSELAGE (IUGB05)

| | | | | | | |
|--------|--------|------|-------|-------------------|------|-----------|
| SYMBOL | NAV/HT | PHI | MACH | PARAMETRIC VALUES | | |
| O | .300 | .000 | 7.000 | ALPHA | .000 | BETA .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, H_i/H_u

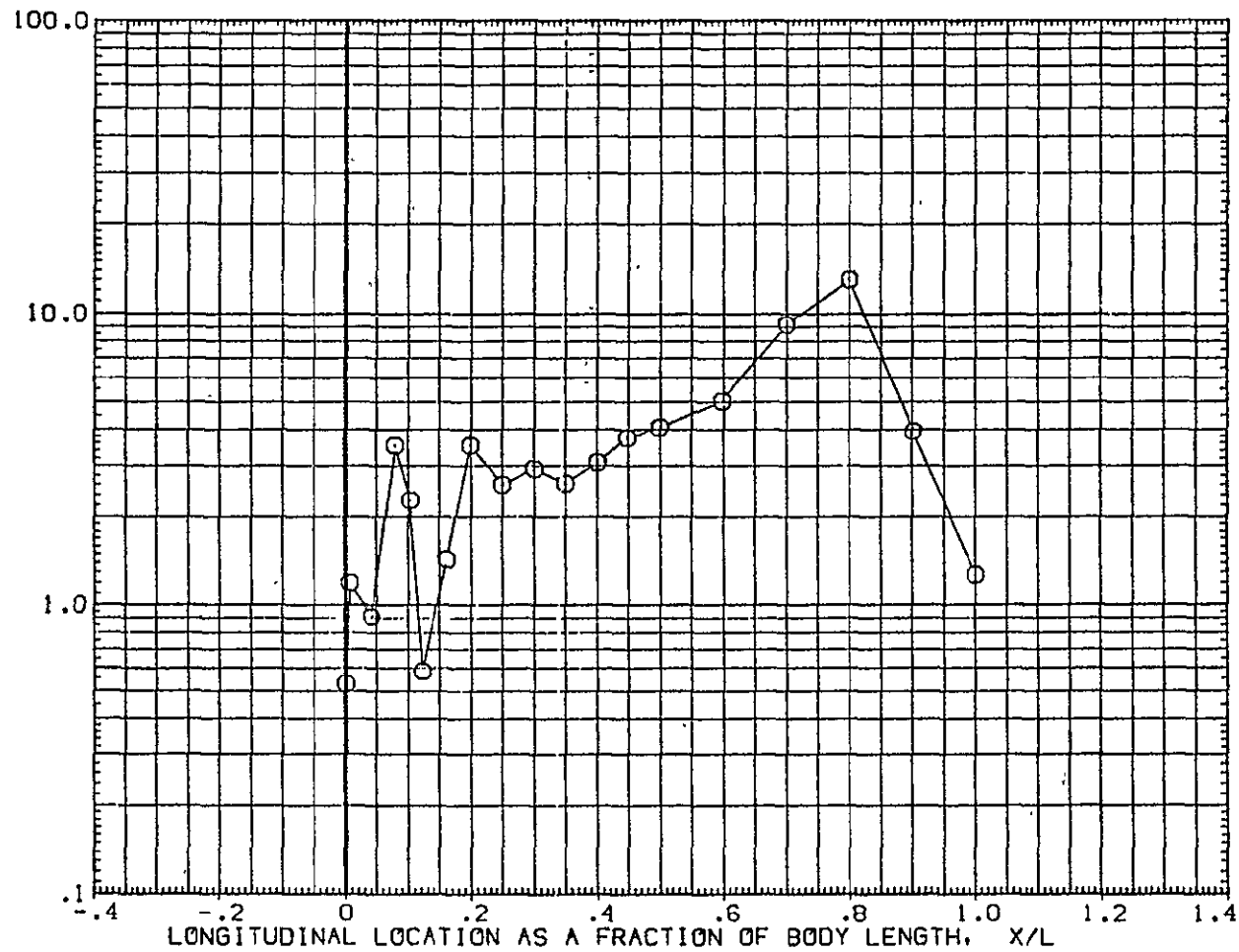


FIG. 8 EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER $\alpha = 0$

OH12 + IH21 MODEL 37 OT(05)/O(07) FUSELAGE (IUG805)

| | | | | | | |
|--------|--------|--------|-------|-------|-------------------|------|
| SYMBOL | HAW/HT | PHI | MACH | ALPHA | PARAMETRIC VALUES | |
| O | .900 | 25.000 | 7.000 | .000 | BETA | .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU

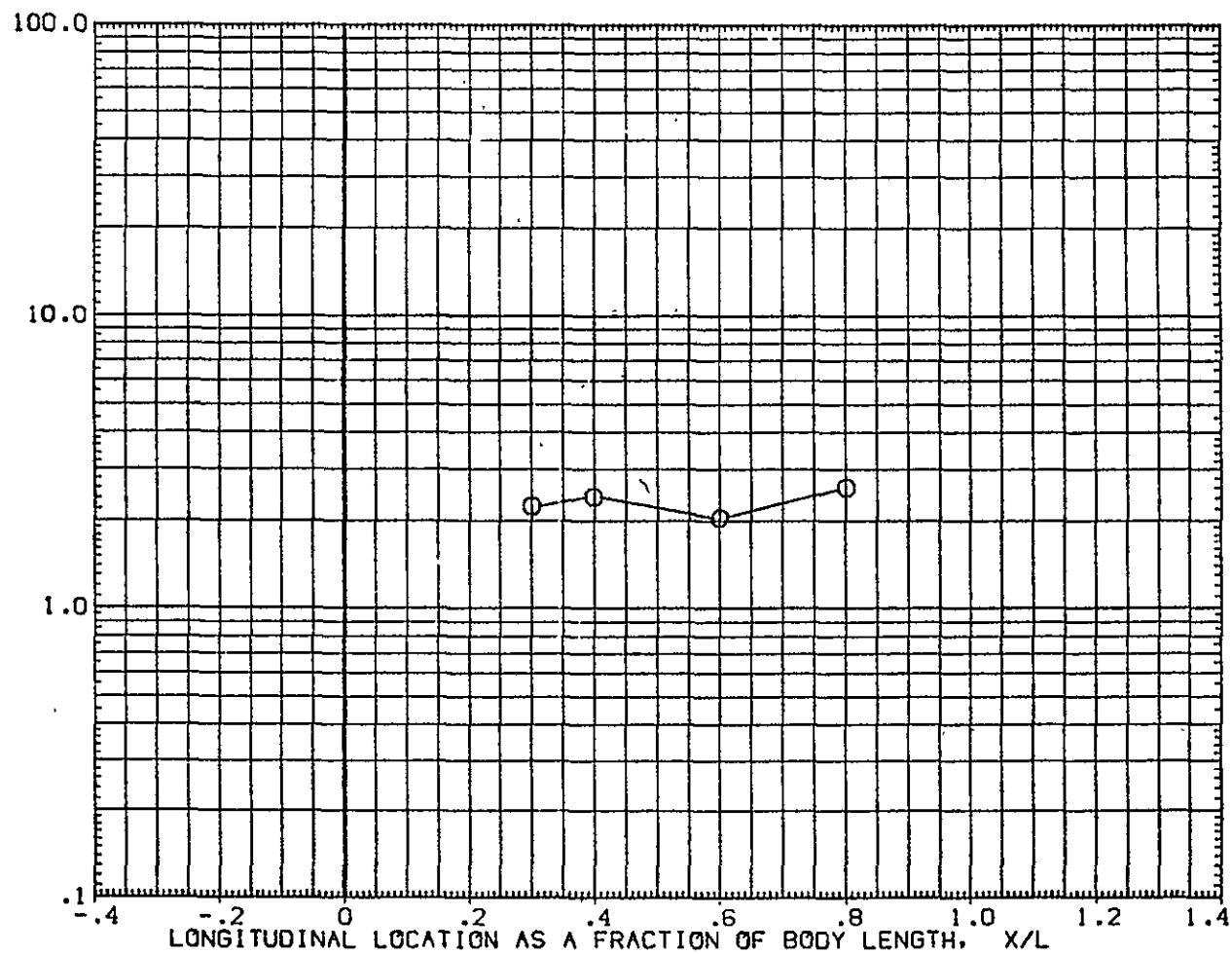


FIG. 8 EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER ALPHA = 0

OH12 + IH21 MODEL 37 0T(05)/0(07) FUSELAGE (IUGB05)

| | | | | | | |
|--------|--------|--------|-------|-------------------|------|-----------|
| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
| ○ | .900 | 30.000 | 7.000 | ALPHA | .000 | BETA .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU

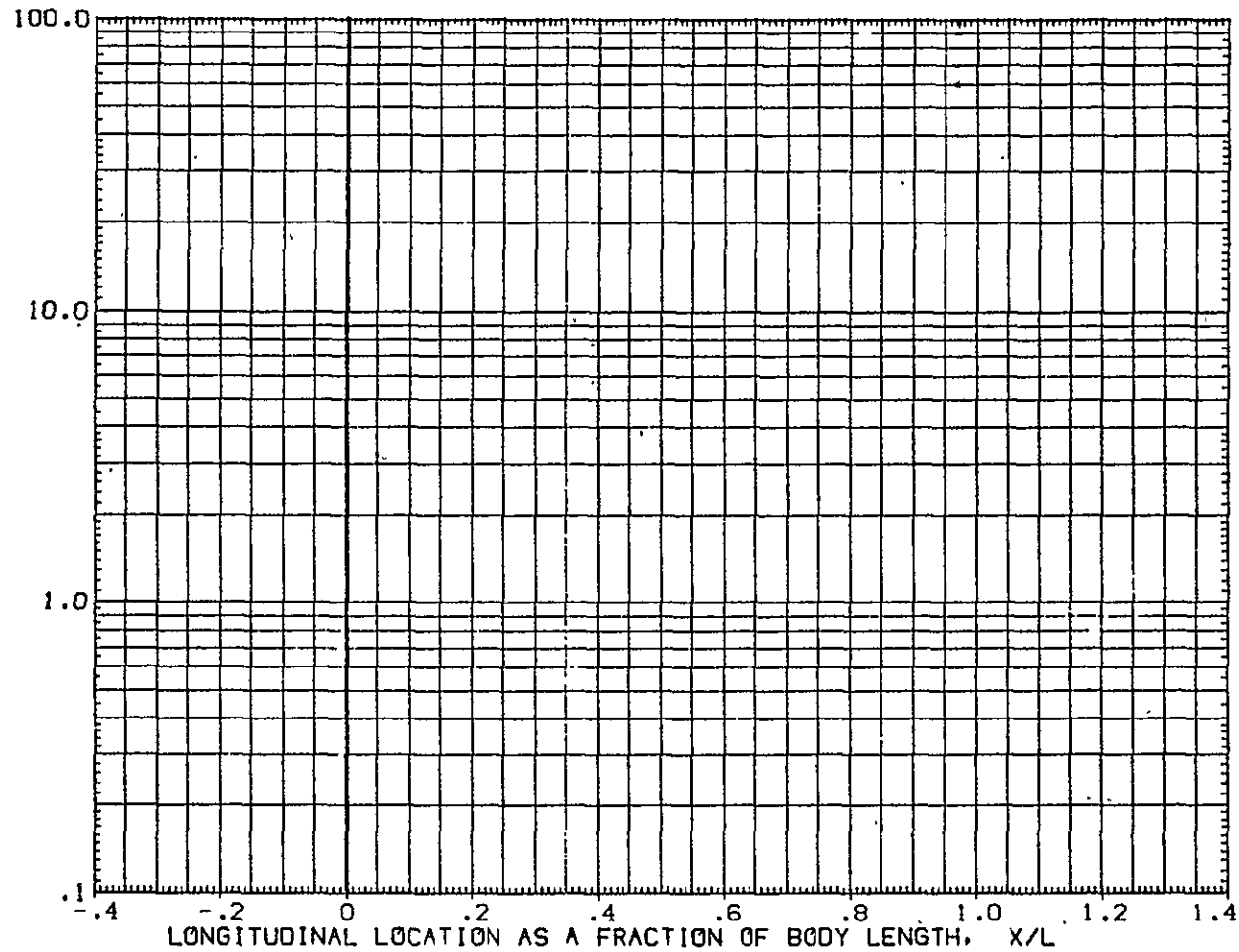


FIG. 8 EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER ALPHA = 0

OH12 + IH21 MODEL 37 OT(05)/O(07) FUSELAGE (IUGB05)

| | | | | | | |
|--------|--------|---------|-------|-------|-------------------|------|
| SYMBOL | HAW/HT | PHI | MACH | ALPHA | PARAMETRIC VALUES | |
| O | .900 | 180.000 | 7.000 | .000 | BETA | .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, H_i/H_u

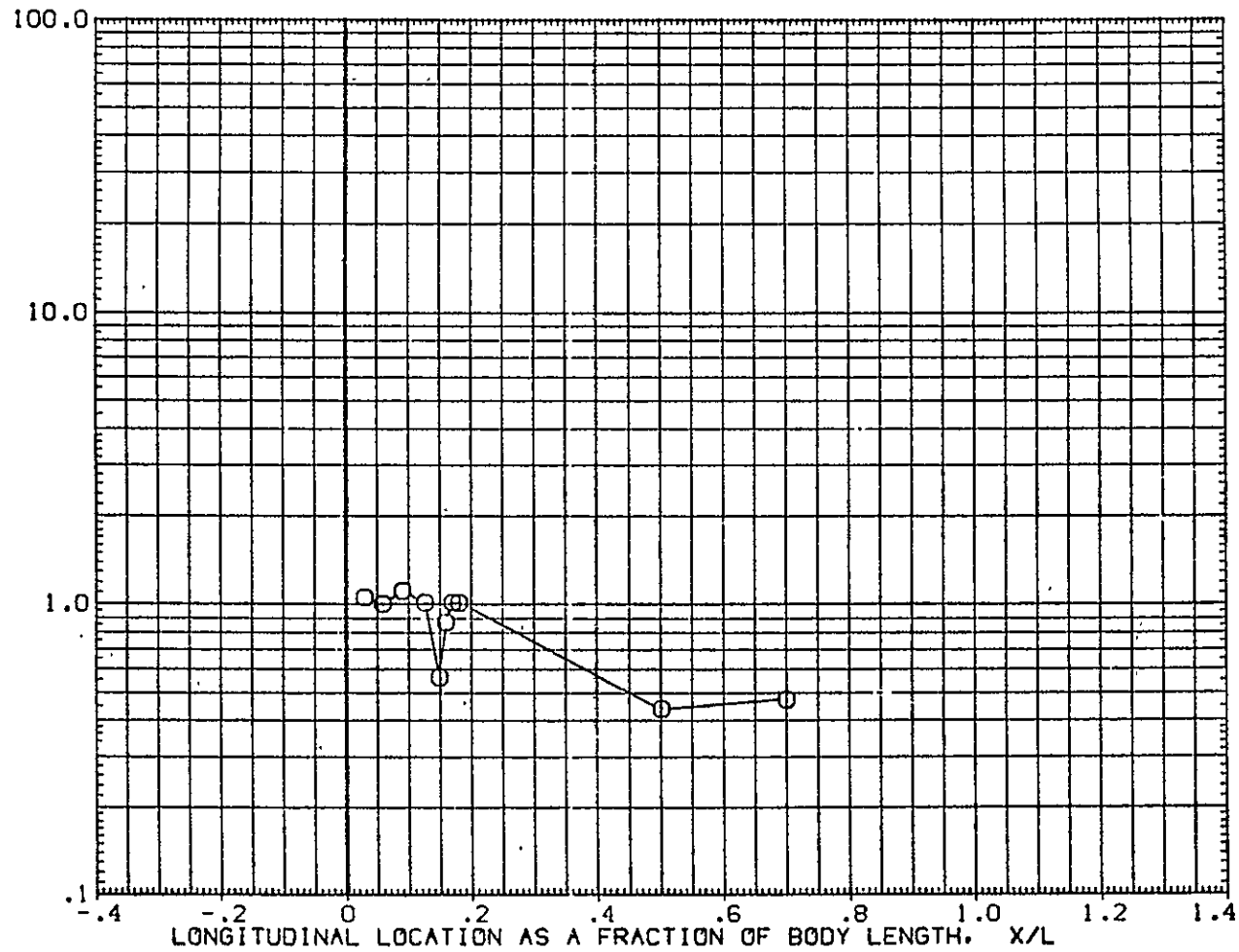


FIG. 8 EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER ALPHA = 0

OH12 + IH21 MODEL 37 OT(05)/O(07) FUSELAGE (IUGB05)

| | | | | | | |
|--------|--------|------|-------|-------------------|------|-----------|
| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
| O | .900 | .000 | 7.610 | ALPHA | .000 | BETA .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, H_i/H_u

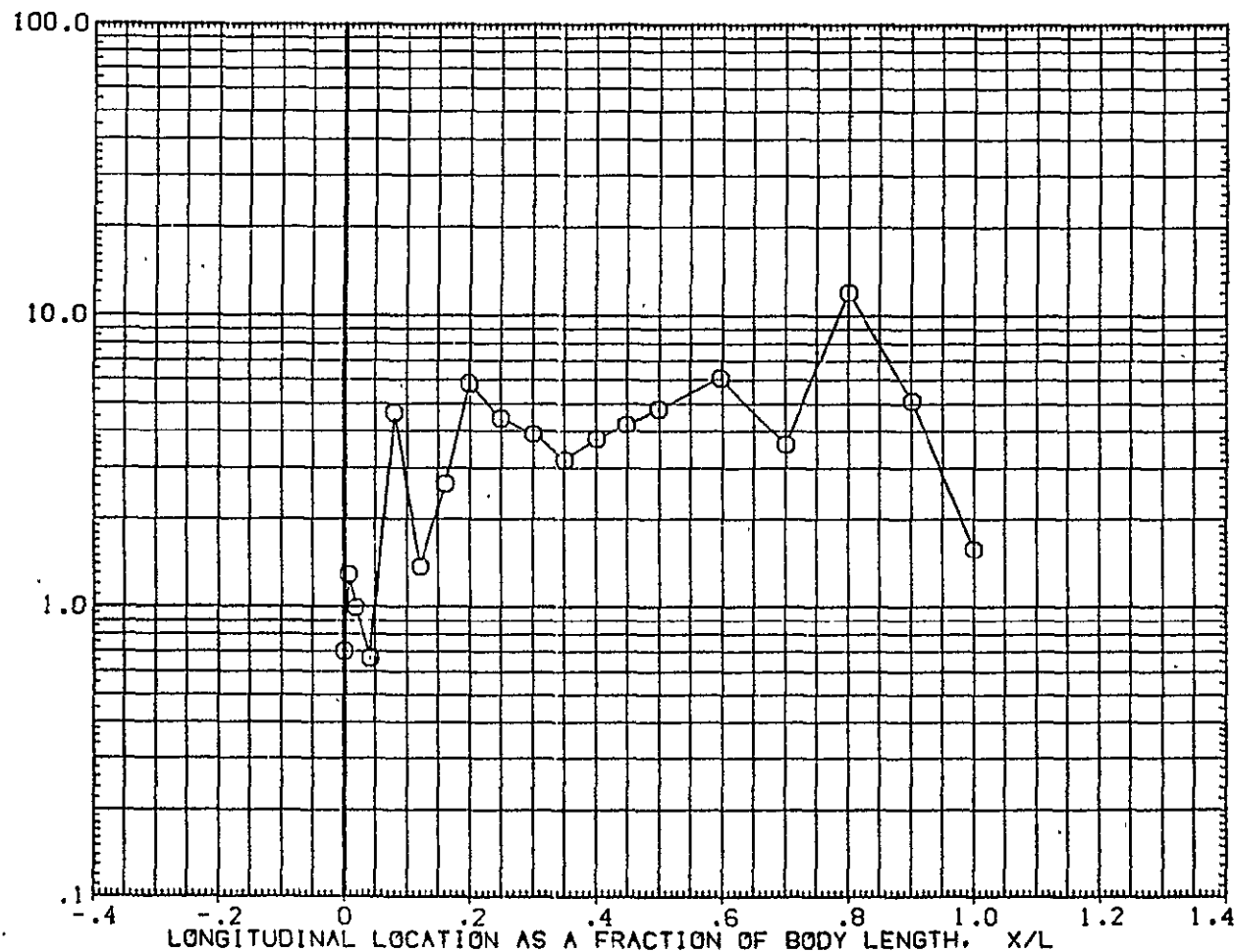


FIG. 8 EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER ALPHA = 0

OH12 + IH21 MODEL 37 OT(05)/O(07) FUSELAGE (IUGB05)

| | | | | | | |
|--------|--------|--------|-------|-------------------|------|-----------|
| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
| ○ | .900 | 25.000 | 7.610 | ALPHA | .000 | BETA .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU

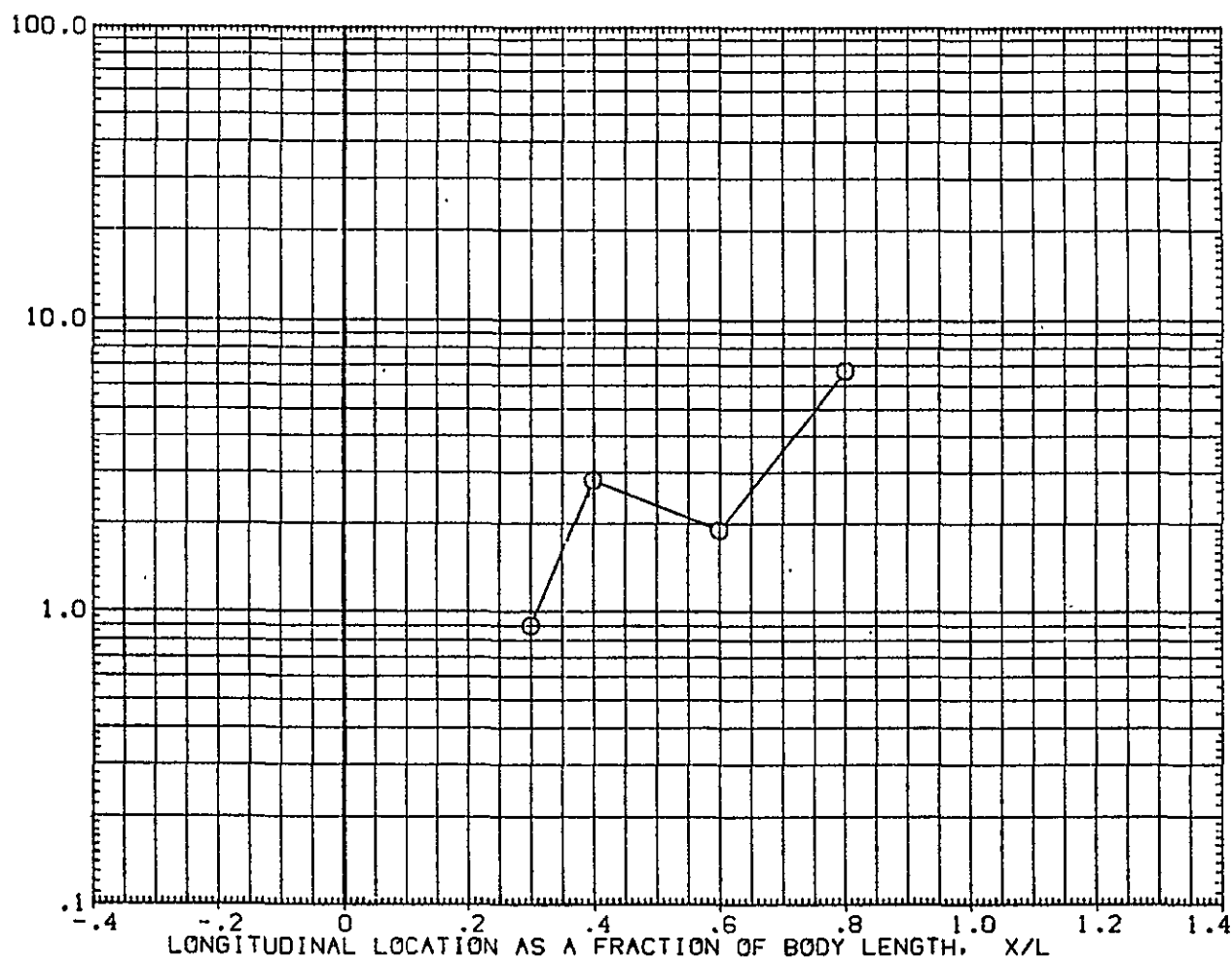


FIG. 8 EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER ALPHA = 0

OH12 + IH21 MODEL 37 OT(05)/0(07) FUSELAGE (IUGB05)

SYMBOL
O
HAW/HT .900
PHI 30.000
MACH 7.610

PARAMETRIC VALUES
ALPHA .000 BETA .000

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, H_i/H_u

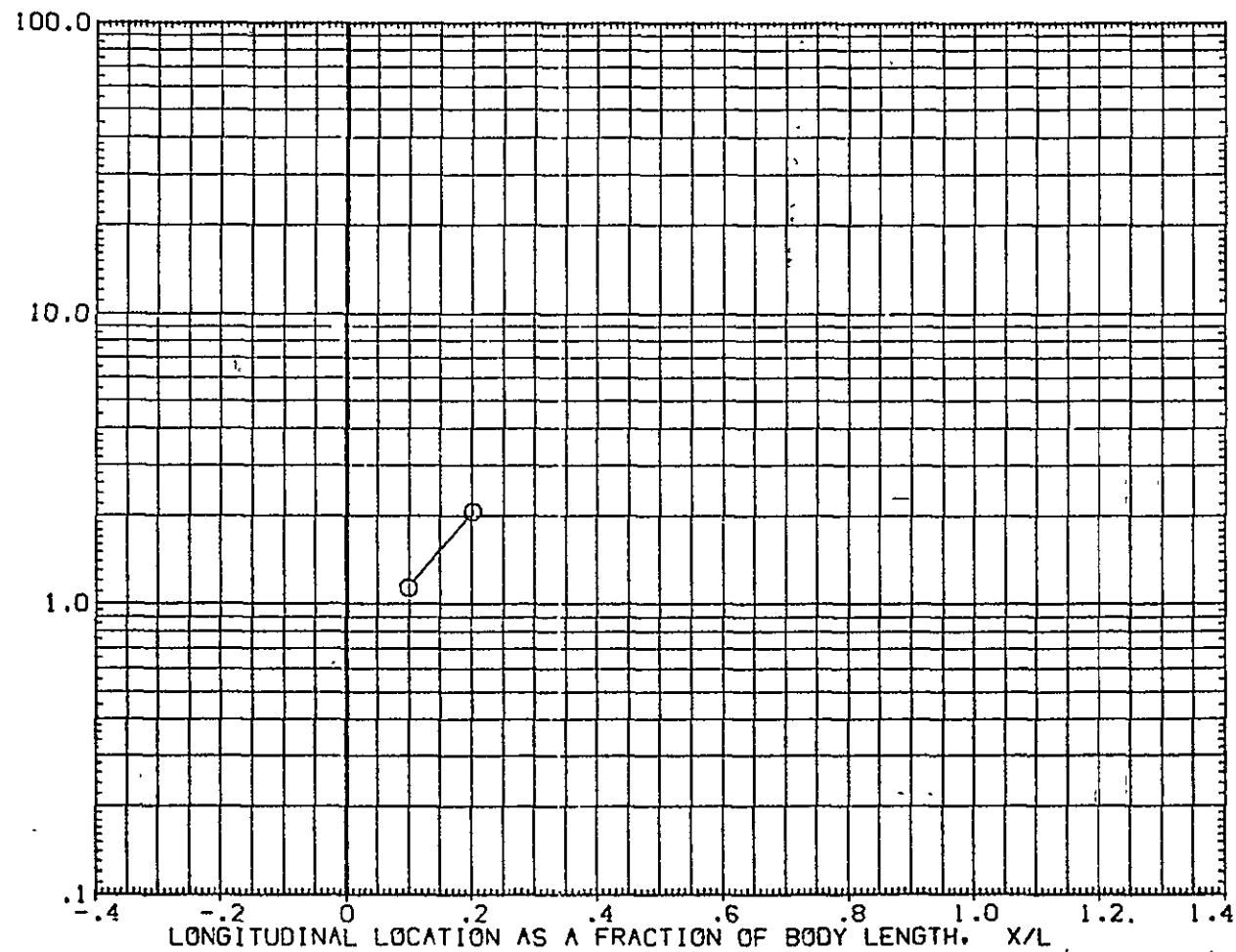


FIG. 8 EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER ALPHA = 0

OH12 + IH21 MODEL 37 OT(05)/O(07) FUSELAGE (IUGB05)

| | | | | | | |
|--------|--------|---------|-------|-------------------|------|-----------|
| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
| O | .900 | 180.000 | 7.610 | ALPHA | .000 | BETA .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, H_i/H_u

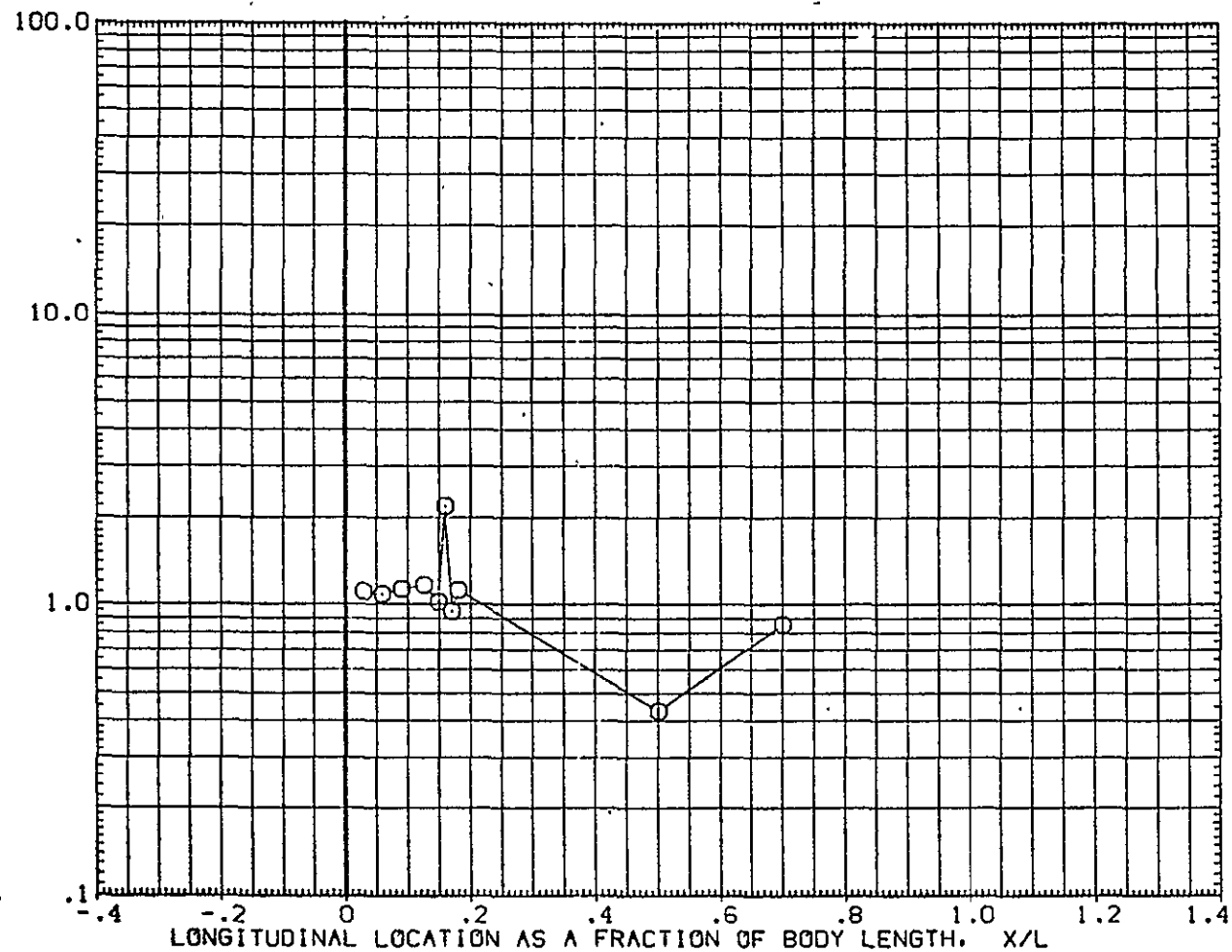


FIG. 8 EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER ALPHA = 0

OH12 + IH21 MODEL 37 OT(05)/O(07) FUSELAGE (IUGB05)

| | | | | | | |
|--------|--------|------|--------|-------------------|------|-----------|
| SYMBOL | HAY/HT | PHI | MACH | PARAMETRIC VALUES | | |
| O | .900 | .000 | 18.300 | ALPHA | .000 | BETA .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, H_i/H_u

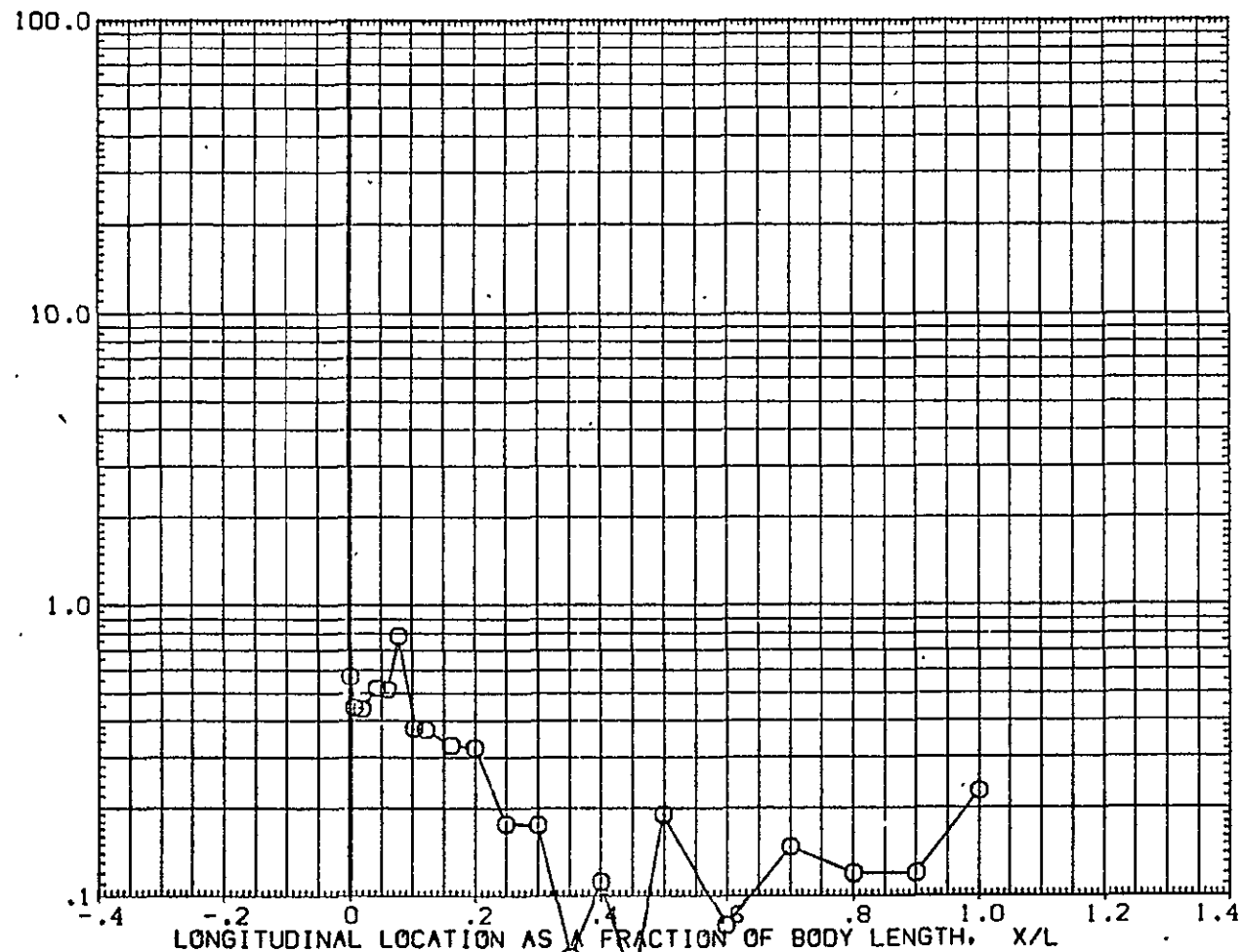


FIG. 8 EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER ALPHA = 0

OH12 + IH21 MODEL 37 0T(05)/0(07) FUSELAGE (IUG805)

SYMBOL
O
HAW/HT
.900
PHI
25.000
MACH
18.300

PARAMETRIC VALUES
ALPHA
.000
BETA
.000

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, H_i/H_u

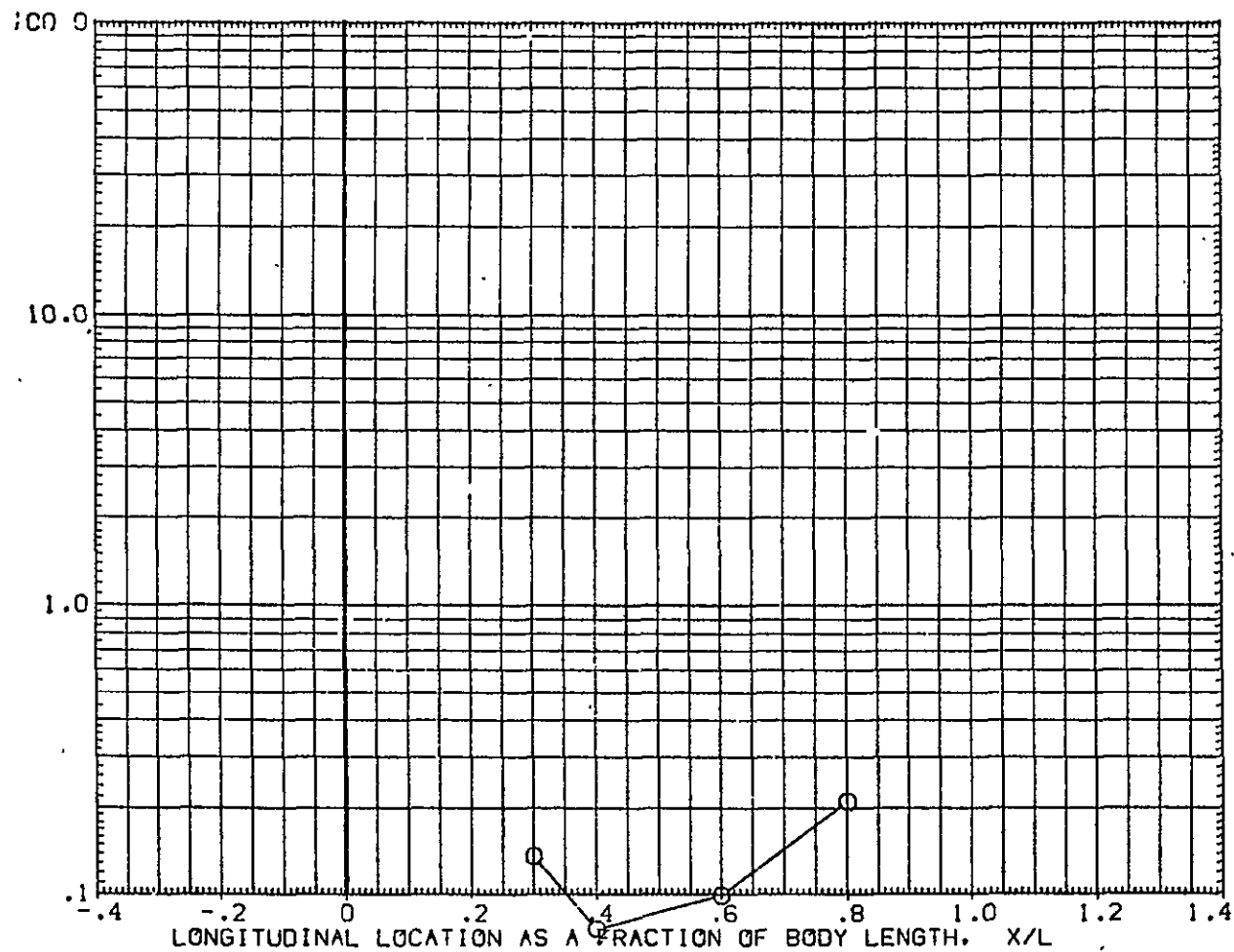


FIG. 8 EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER ALPHA = 0

OH12 + IH21 MODEL 37 0T(05)/0(07) FUSELAGE (IUGB05)

| | | | | | | |
|--------|--------|--------|--------|-------|-------------------|------|
| SYMBOL | HAW/HT | PHI | MACH | ALPHA | PARAMETRIC VALUES | |
| ○ | .900 | 30.000 | 18.300 | .000 | BETA | .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU

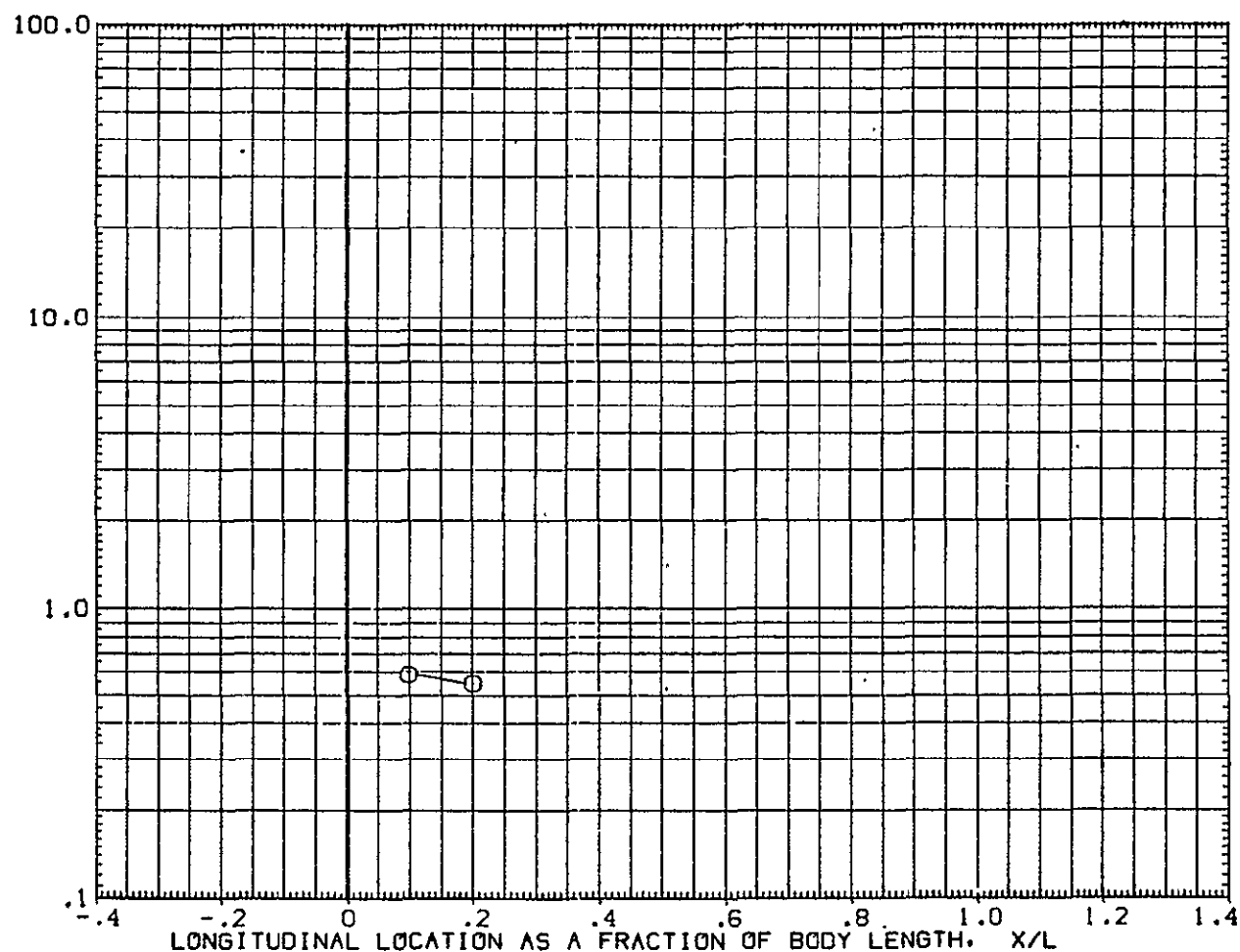


FIG. 8 EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER ALPHA = 0

OH12 + IH21 MODEL 37 0T(05)/0(07) FUSELAGE (IUGB05)

| | | | | | | |
|--------|--------|---------|--------|-------|-------------------|------|
| SYMBOL | HAW/HT | PHI | MACH | ALPHA | PARAMETRIC VALUES | |
| ○ | .900 | 180.000 | 18.300 | .000 | BETA | .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, H_i/H_u

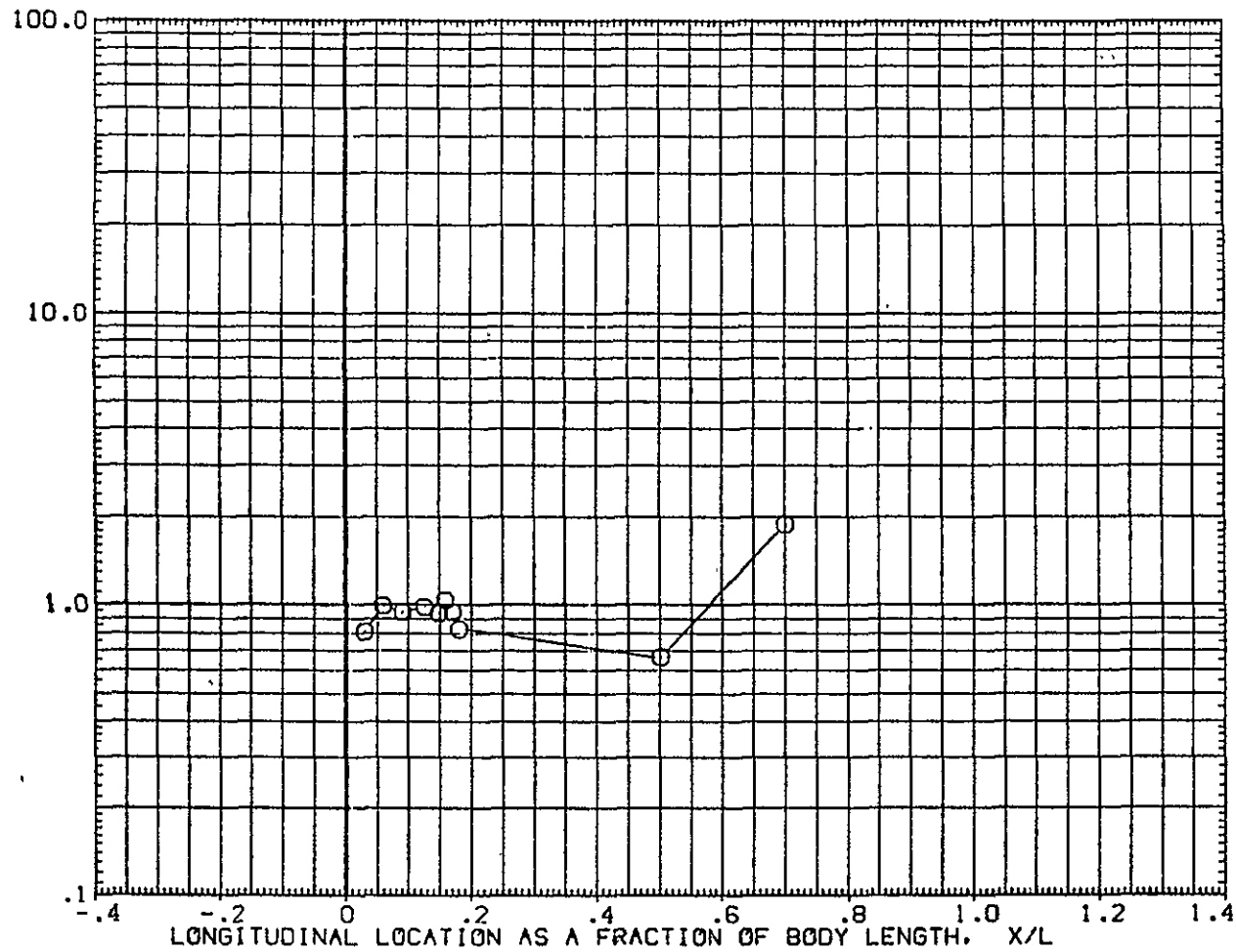


FIG. 8 EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER ALPHA = 0

OH12 + IH21 MODEL 37 0T(05)/0(07) FUSELAGE (IUGB05)

| | | | | | | | |
|--------|--------|------|--------|-------------------|------|------|------|
| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | | |
| O | .900 | .000 | 19.180 | ALPHA | .000 | BETA | .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, H_i/H_u

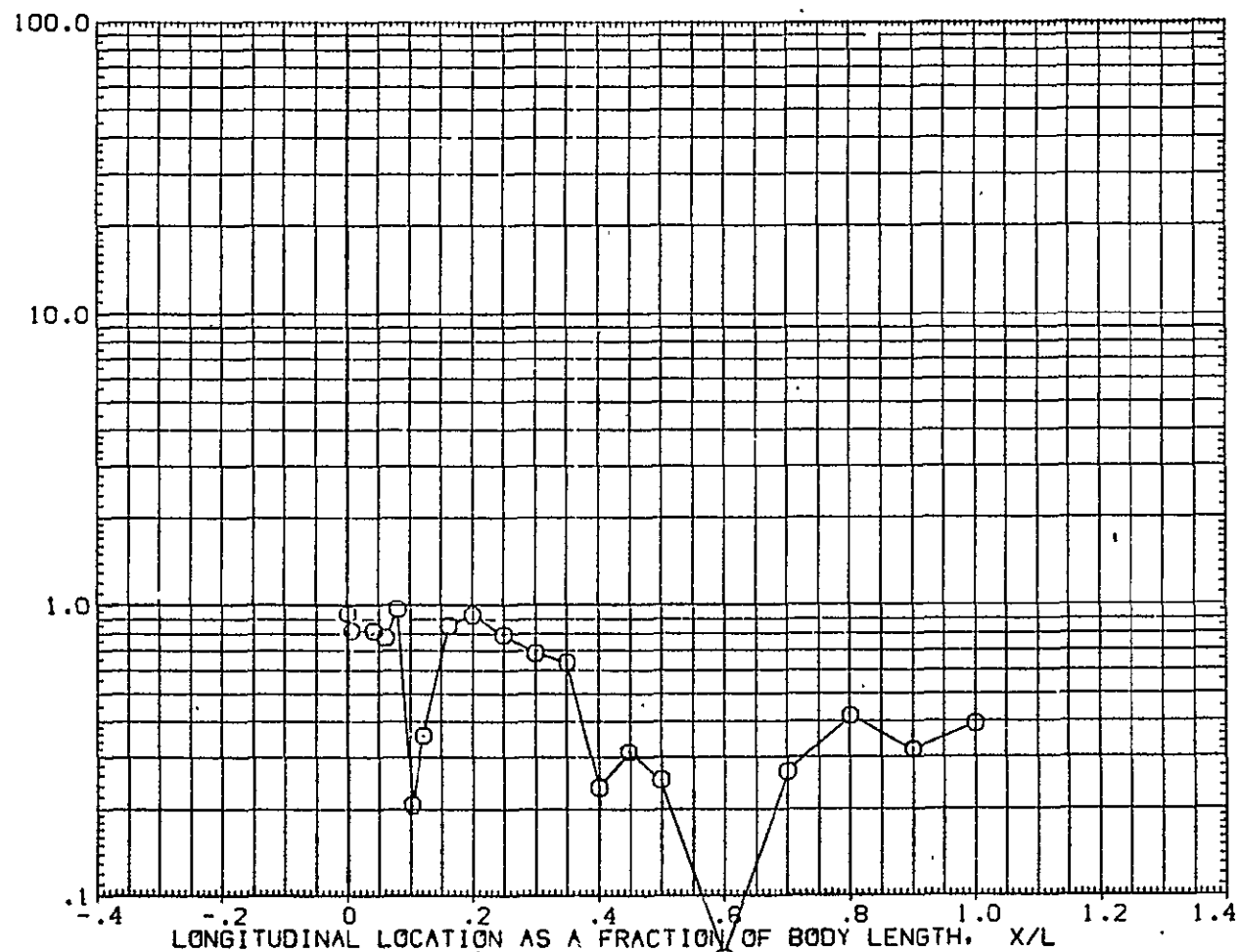


FIG. 8 EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER ALPHA = 0

OH12 + IH21 MODEL 37 0T(05)/0(07) FUSELAGE (IUGB05)

SYMBOL
O
HAW/HT
.900
PHI
25.000
MACH
19.180

PARAMETRIC VALUES
ALPHA
.000
BETA
.000

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, H_i/H_u

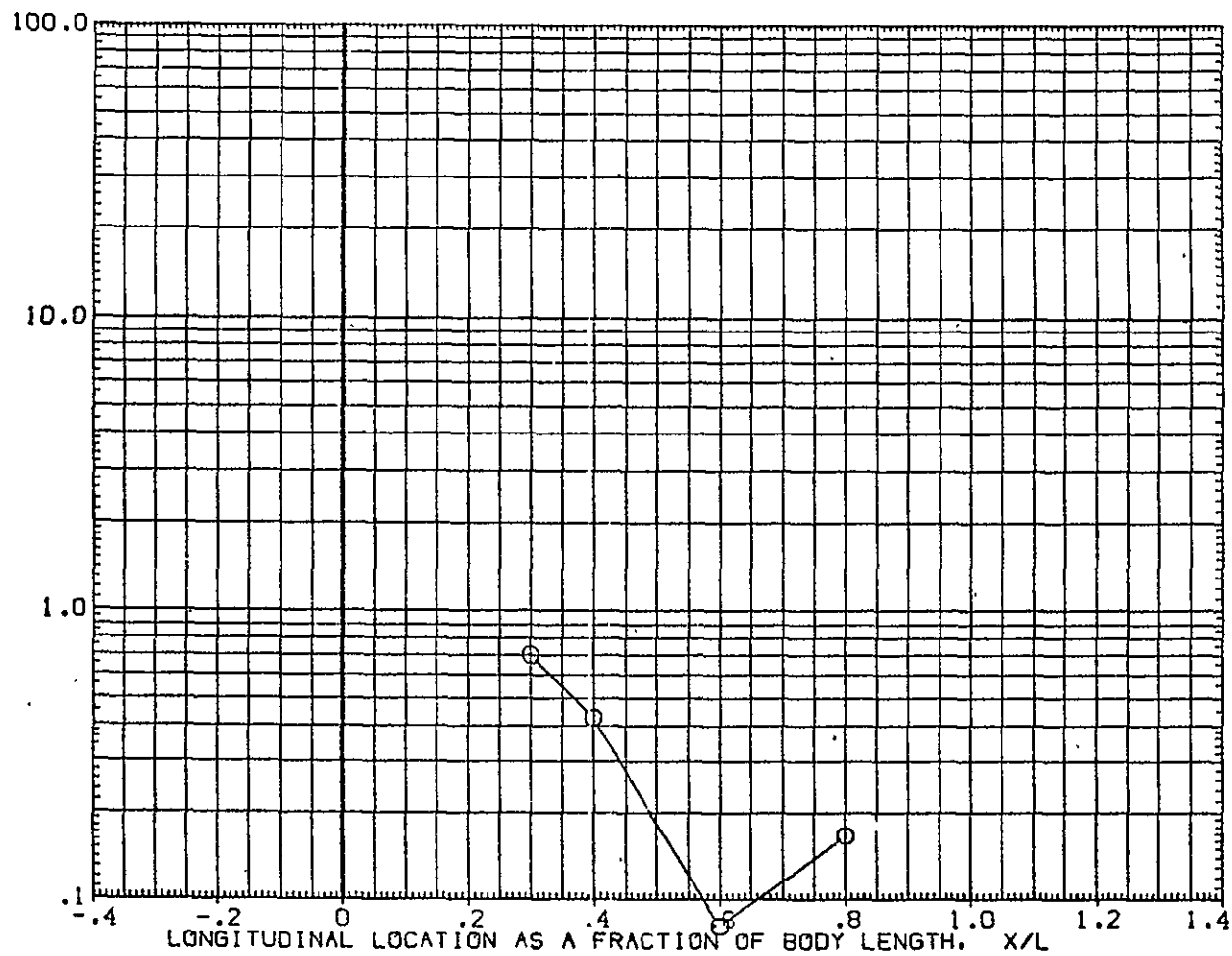


FIG. 8 EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER ALPHA = 0

OH12 + IH21 MODEL 37 OT(05)/0(07) FUSELAGE (IUGB05)

| | | | | | | |
|--------|--------|--------|--------|-------------------|------|------|
| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
| ○ | .900 | 30.000 | 19.180 | ALPHA | .000 | BETA |
| | | | | | | .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, H_i/H_u

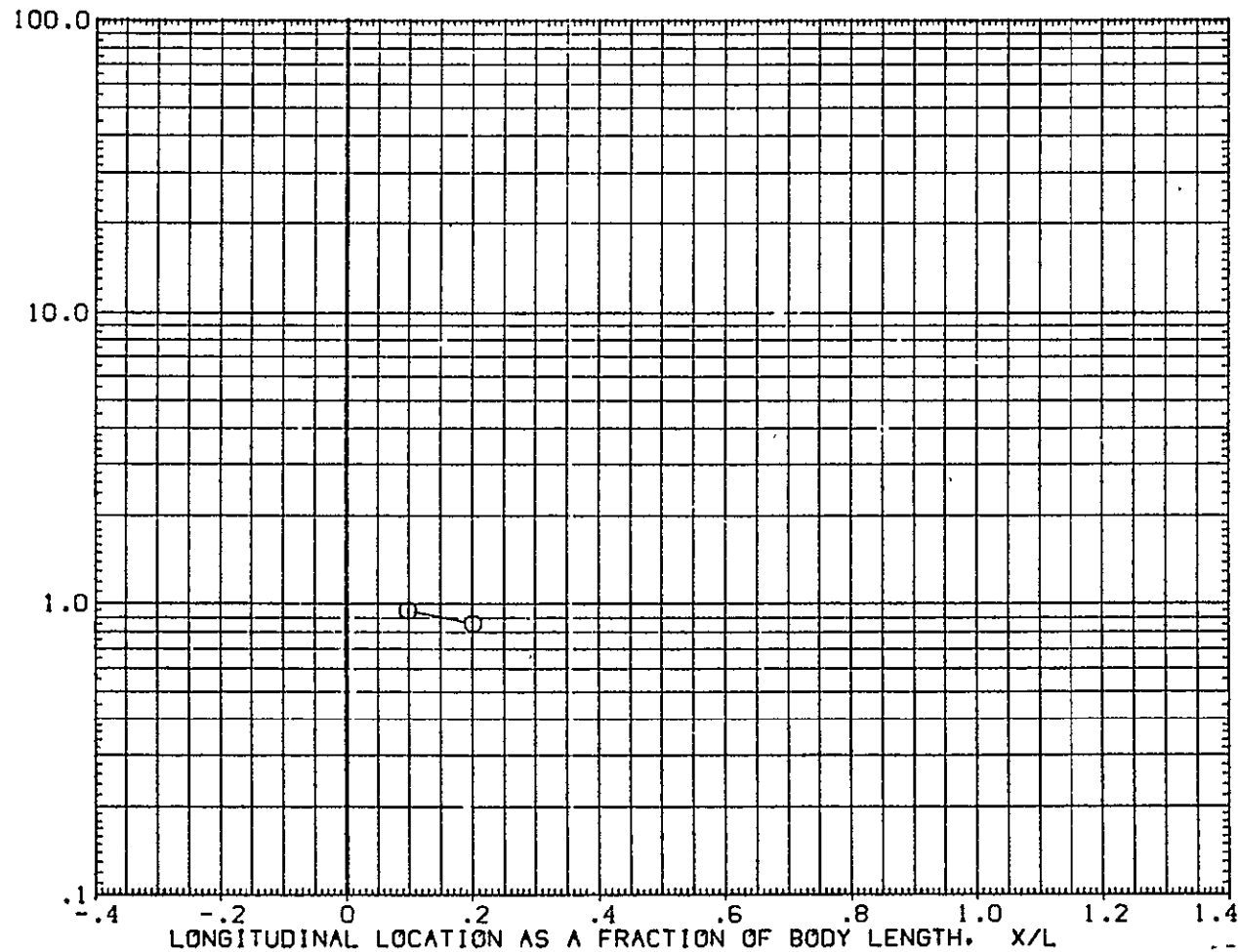


FIG. 8 EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER ALPHA = 0

REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR

C-5

OH12 + IH21 MODEL 37 OT(05)/O(07) FUSELAGE (IUGB05)

| | | | | | | |
|--------|--------|---------|--------|-------------------|------|-----------|
| SYMBOL | RAV/HT | PHI | MACH | PARAMETRIC VALUES | | |
| O | .900 | 180.000 | 19.180 | ALPHA | .000 | BETA .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, H_i/H_u

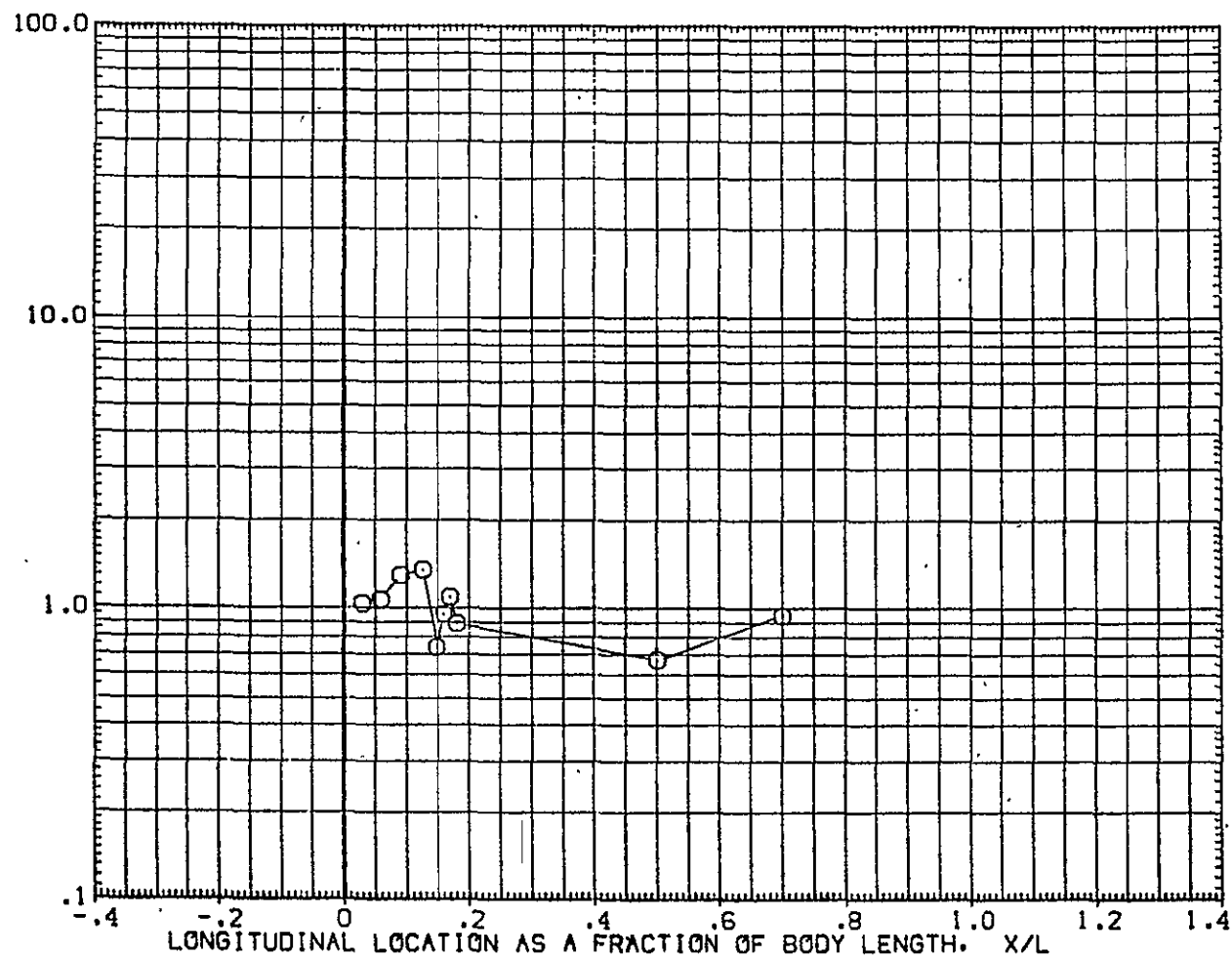


FIG. 8 EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER ALPHA = 0

0H12/1H21 (CAL HST 173-100) 37 0

WING L.S.(RUGW07)

| | | | | | | |
|--------|--------|------|-------|-------------------|------|------|
| SYMBOL | HAW/HT | 2Y/B | MACH | PARAMETRIC VALUES | | |
| □ | .850 | .250 | 6.997 | ALPHA | .000 | BETA |
| ◇ | .900 | | | | | .000 |
| ◇ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

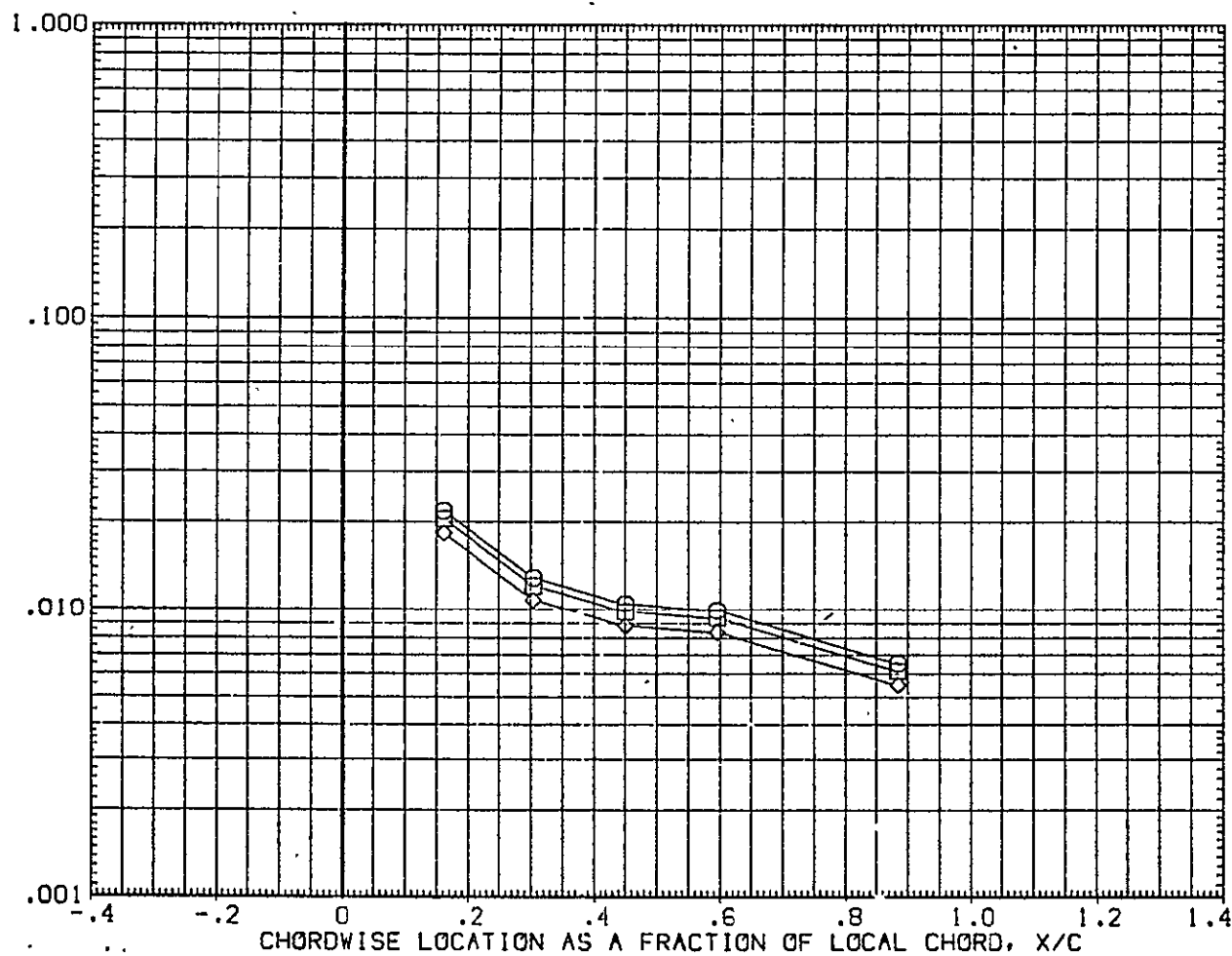


FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER $\alpha = 0^\circ$

0H12/1H21 (CAL HST 173-100) 37 0

WING L.S. (RUGW07)

| SYMBOL | HAW/HT | ZY/B | MACH | PARAMETRIC VALUES | | |
|--------|--------|------|-------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| □ | .850 | .400 | 6.997 | .000 | | .000 |
| ◇ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

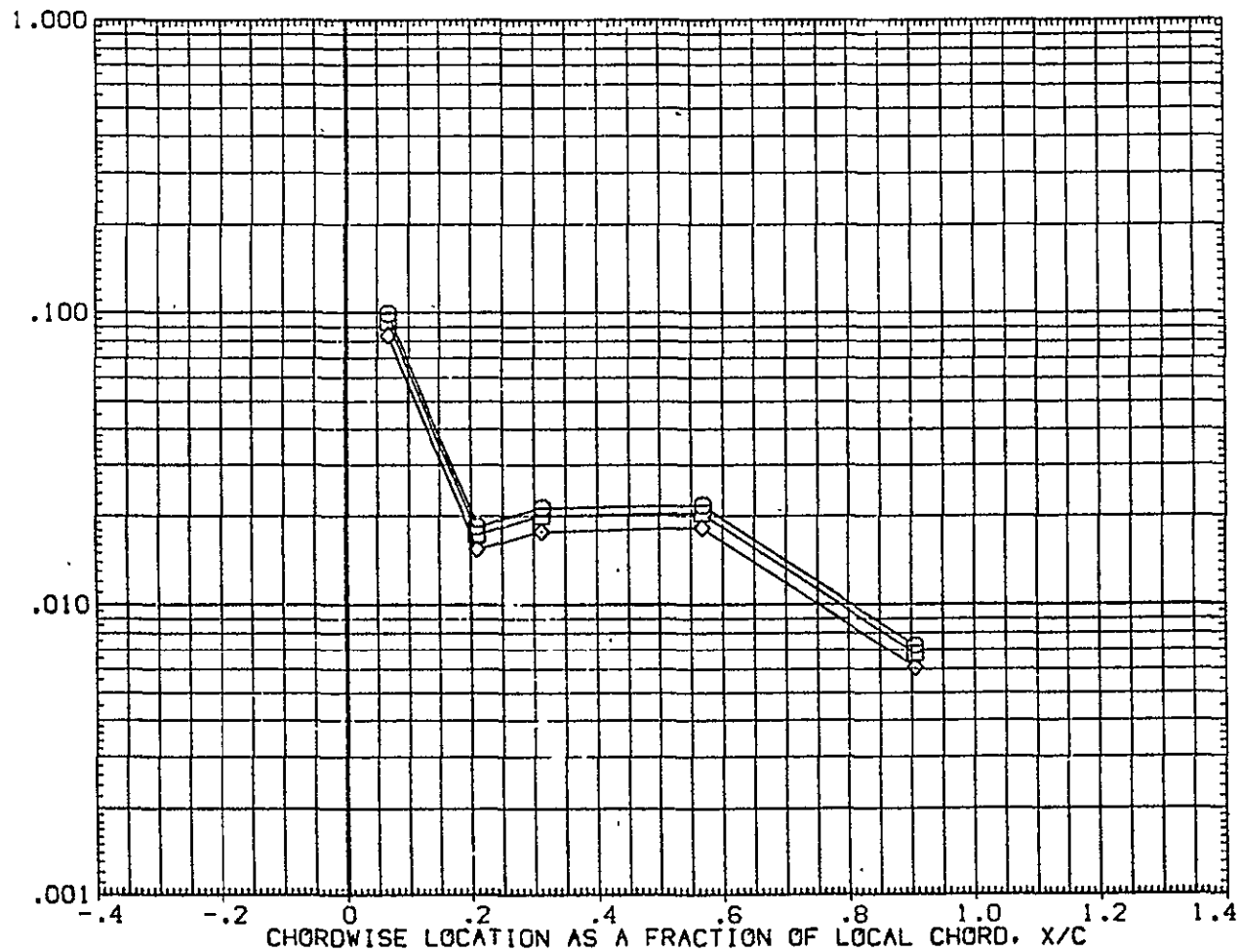
RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, h/h_{REF} 

FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER · ALPHA = 0

OH12/IH21 (CAL HST 173-100) 37°0

WING L.S.(RUGW07)

| | | | | | | |
|--------|--------|------|-------|-------------------|------|------|
| SYMBOL | HAW/HT | 2Y/B | MACH | PARAMETRIC VALUES | | |
| ◇ | .850 | .500 | 6.997 | ALPHA | .000 | BETA |
| ◇ | .900 | | | | | .000 |
| ◇ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

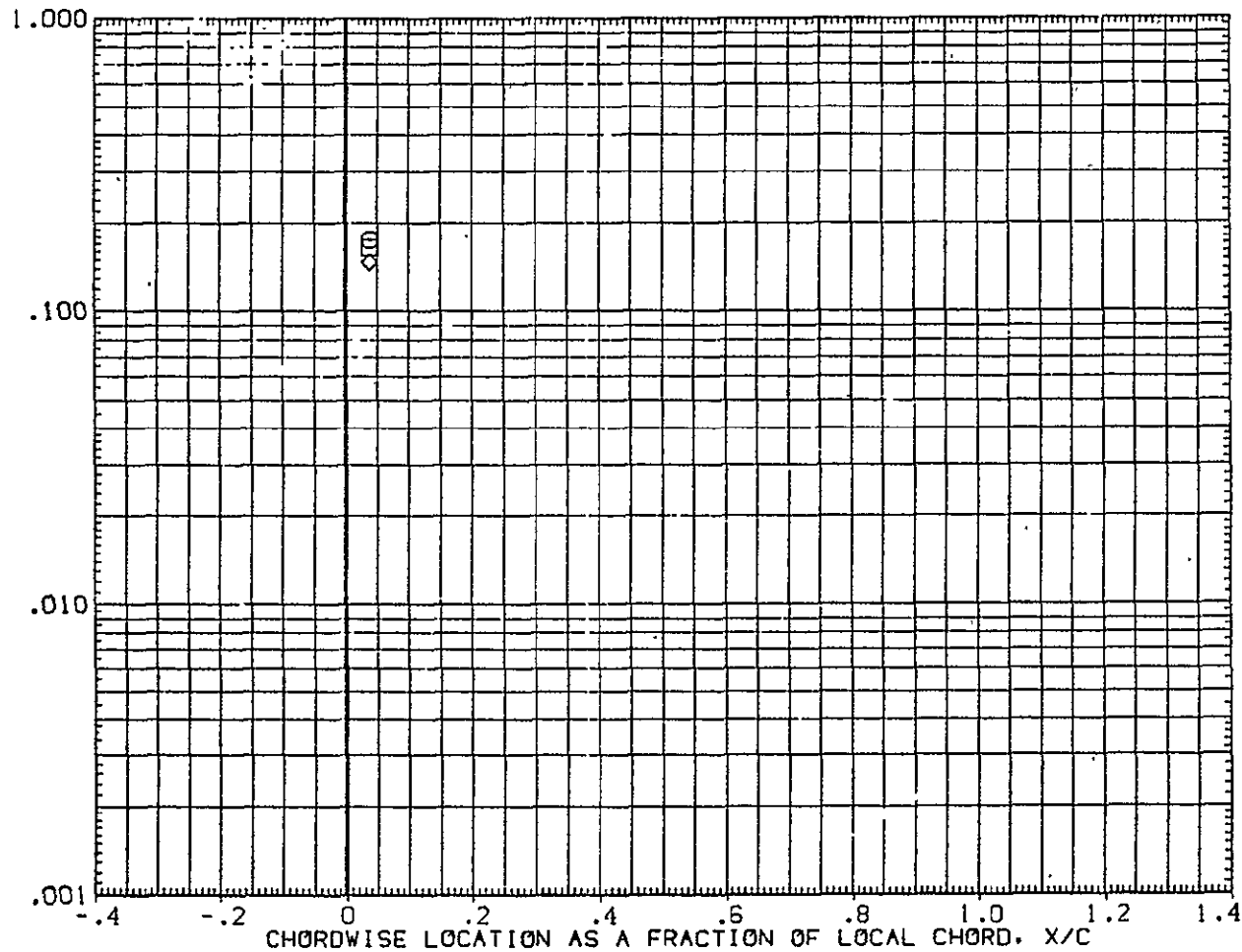
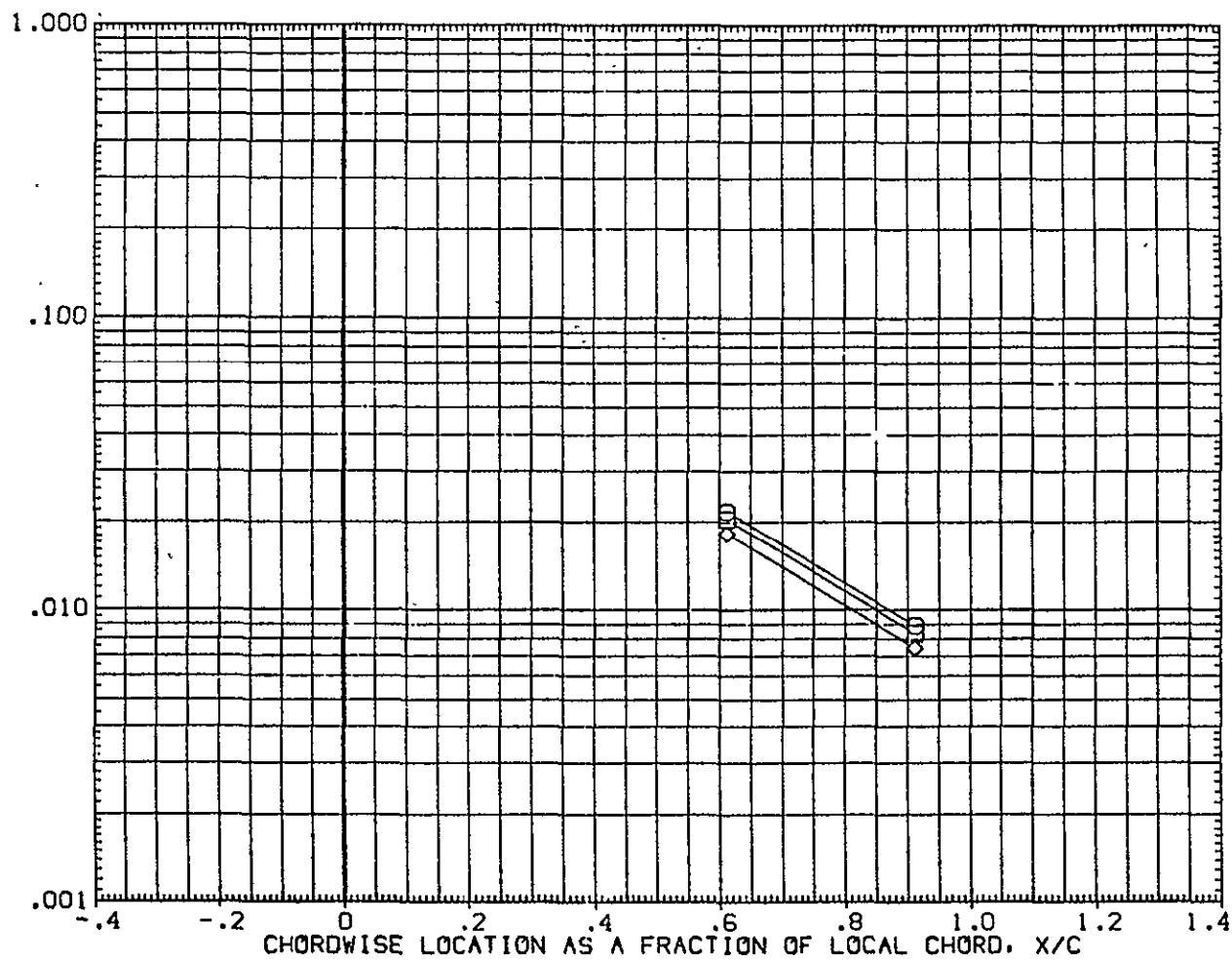


FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER ALPHA = 0

0H12/1H21 (CAL HST 173-100) 37 0

WING L.S.(RUGW07)

| SYMBOL | HAW/HT | 2Y/B | MACH | ALPHA | PARAMETRIC VALUES | BETA | |
|--------|--------|------|-------|-------|-------------------|------|------|
| ◇ | .850 | .600 | 6.997 | .000 | | | .000 |
| □ | .900 | | | | | | |
| ○ | 1.000 | | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF} FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER $\alpha = 0$

OH12/1H21 (CAL HST 173-100) 37 0

WING L.S.(RUGW07)

| SYMBOL | HAW/PT | 2Y/B | MACH | PARAMETRIC VALUES | | |
|--------|--------|------|-------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| □ | .850 | .750 | 6.997 | .000 | .000 | .000 |
| ◇ | .900 | | | | | |
| | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

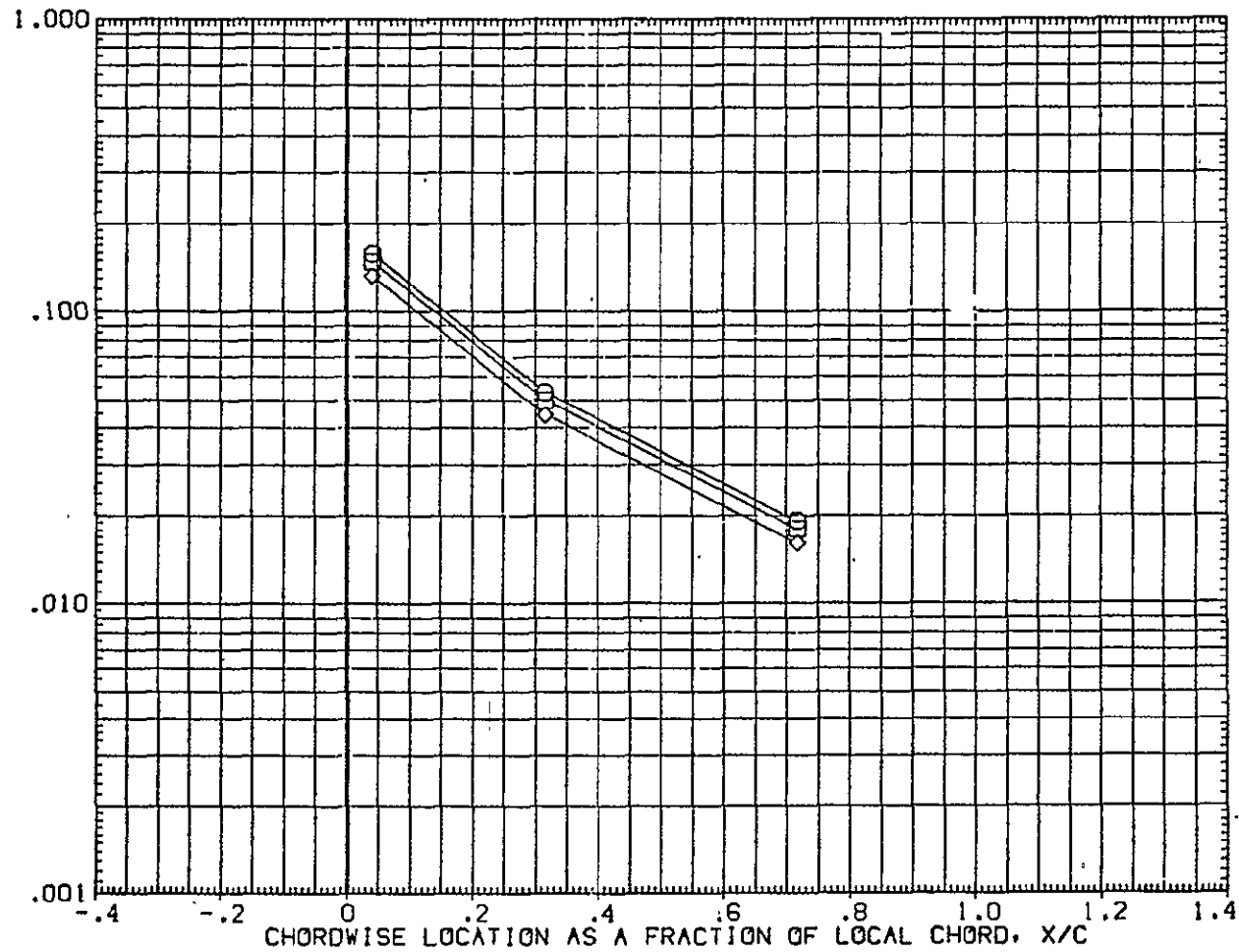
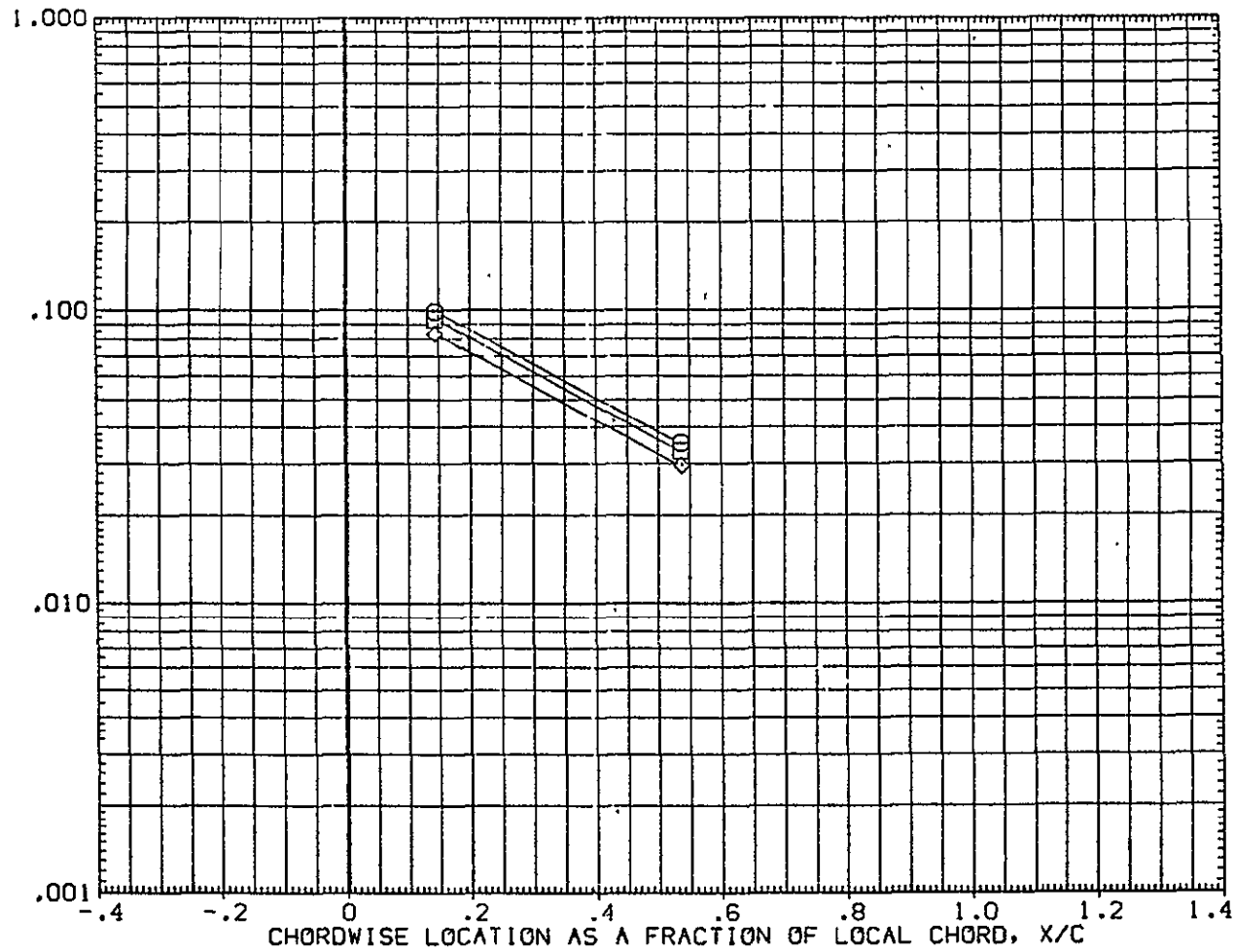


FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER $\alpha = 0$

OH12/IH21 (CAL HST 173-100) 37 0

WING L.S.(RUGW07)

| SYMBOL | HAW/HT | 2Y/B | MACH | PARAMETRIC VALUES | | |
|--------|--------|------|-------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| ○ | .850 | .950 | 6.997 | .000 | | .000 |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF} FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER $\alpha = 0$

CH12/1H21 (CAL HST 173-100) 37 0

WING L.S.(RUGW07)

| SYMBOL | HAW/HT | ZY/B | MACH | PARAMETRIC VALUES | | |
|--------|--------|------|-------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| ○ | .850 | .250 | 7.614 | .000 | | .000 |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

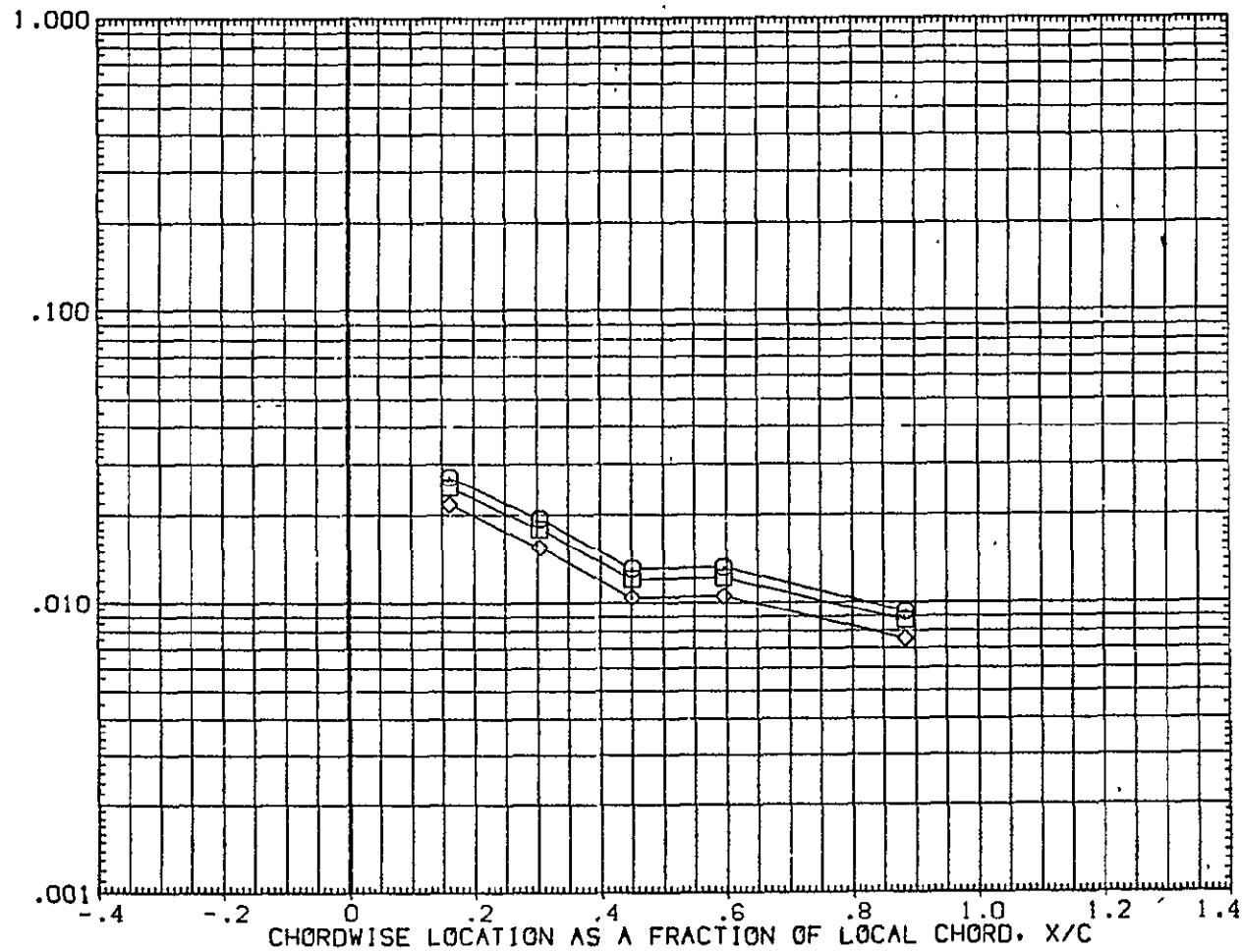
RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF} 

FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER ALPHA = 0

0H12/1H21 (CAL HST I73-100) 37 0

WING L.S.(RUGW07)

| SYMBOL | HAW/HT | 2Y/B | MACH | PARAMETRIC VALUES | | |
|--------|--------|------|-------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| ○ | .850 | .400 | 7.614 | .000 | .000 | .000 |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

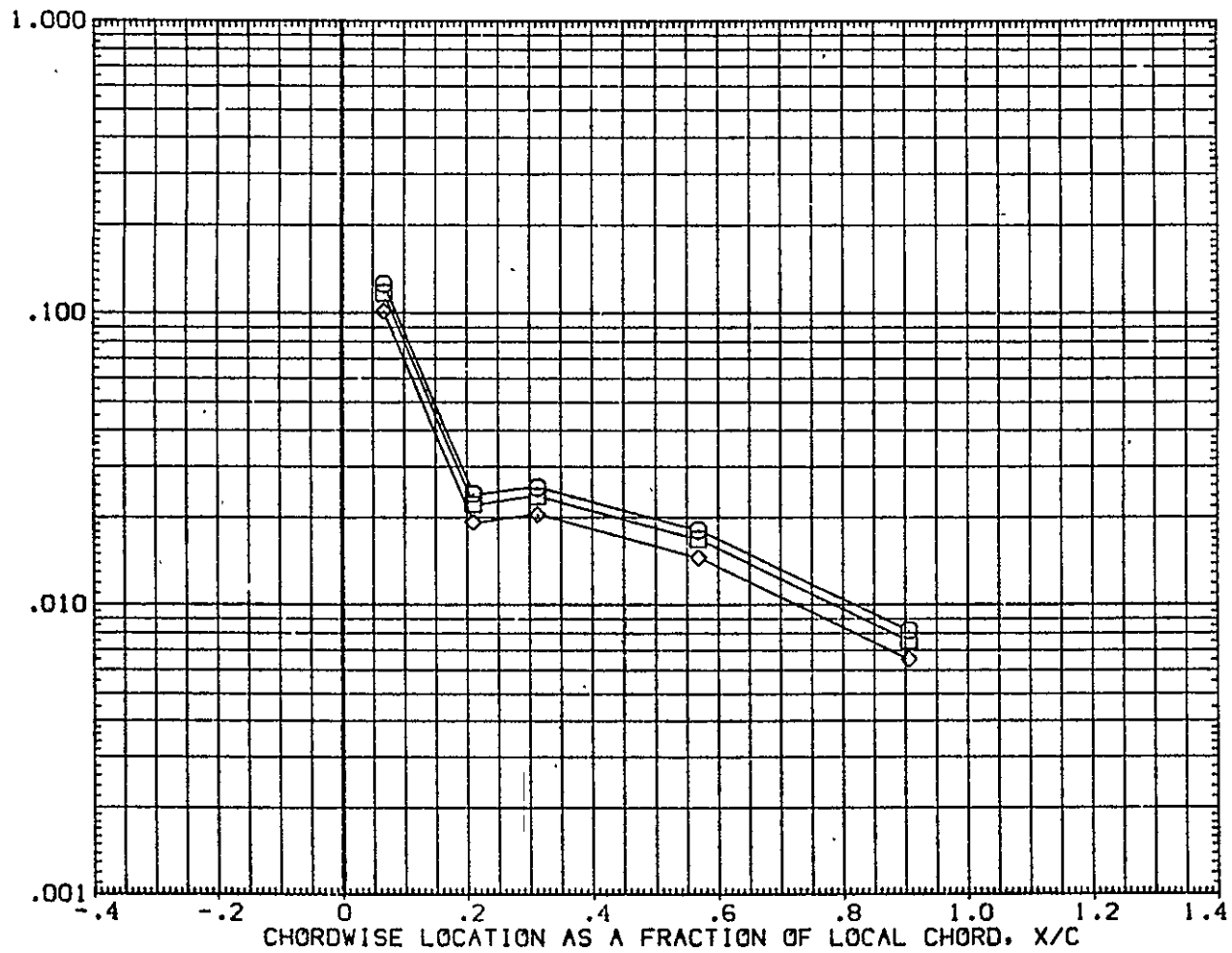


FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER $\alpha = 0$

0H12/1H21 (CAL HST 173-100) 37 0

WING L.S.(RUGW07)

| | | | | | | |
|--------|--------|------|-------|-------------------|------|------|
| SYMBOL | HAW/HT | 2Y/B | MACH | PARAMETRIC VALUES | | |
| ○ | .850 | .500 | 7.614 | ALPHA | .000 | BETA |
| □ | .900 | | | | | .000 |
| ◇ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, h/h_{REF}

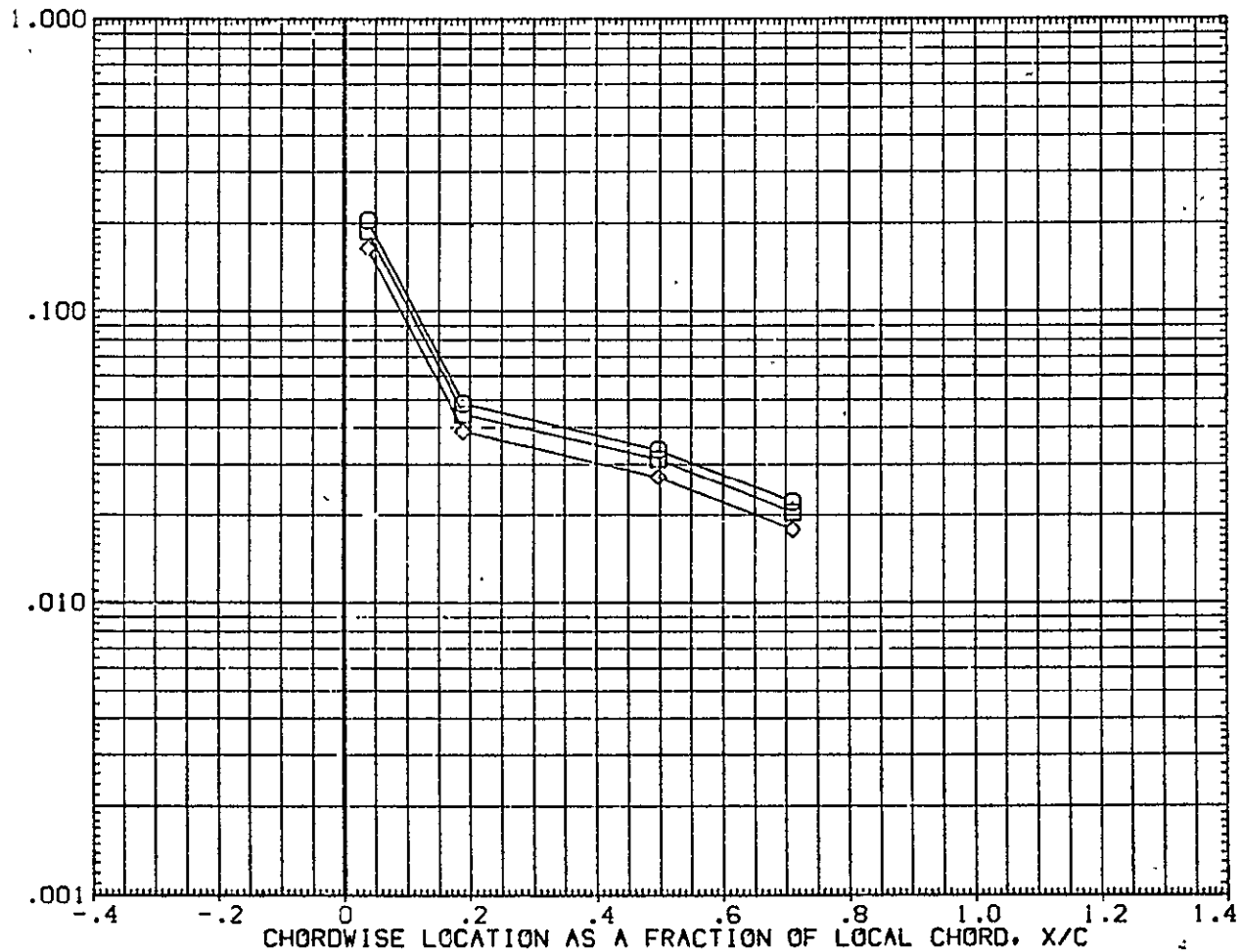


FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER $\alpha = 0$

OH12/IH21 (CAL HST 173-100) 37 0

WING L.S.(RUGW07)

| SYMBOL | HAW/HT | 2Y/B | MACH |
|--------|--------|------|-------|
| □ | .850 | .600 | 7.614 |
| ◇ | .900 | | |
| ◇ | 1.000 | | |

| PARAMETRIC VALUES | |
|-------------------|------|
| ALPHA | BETA |
| .000 | .000 |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, h/h_{REF}

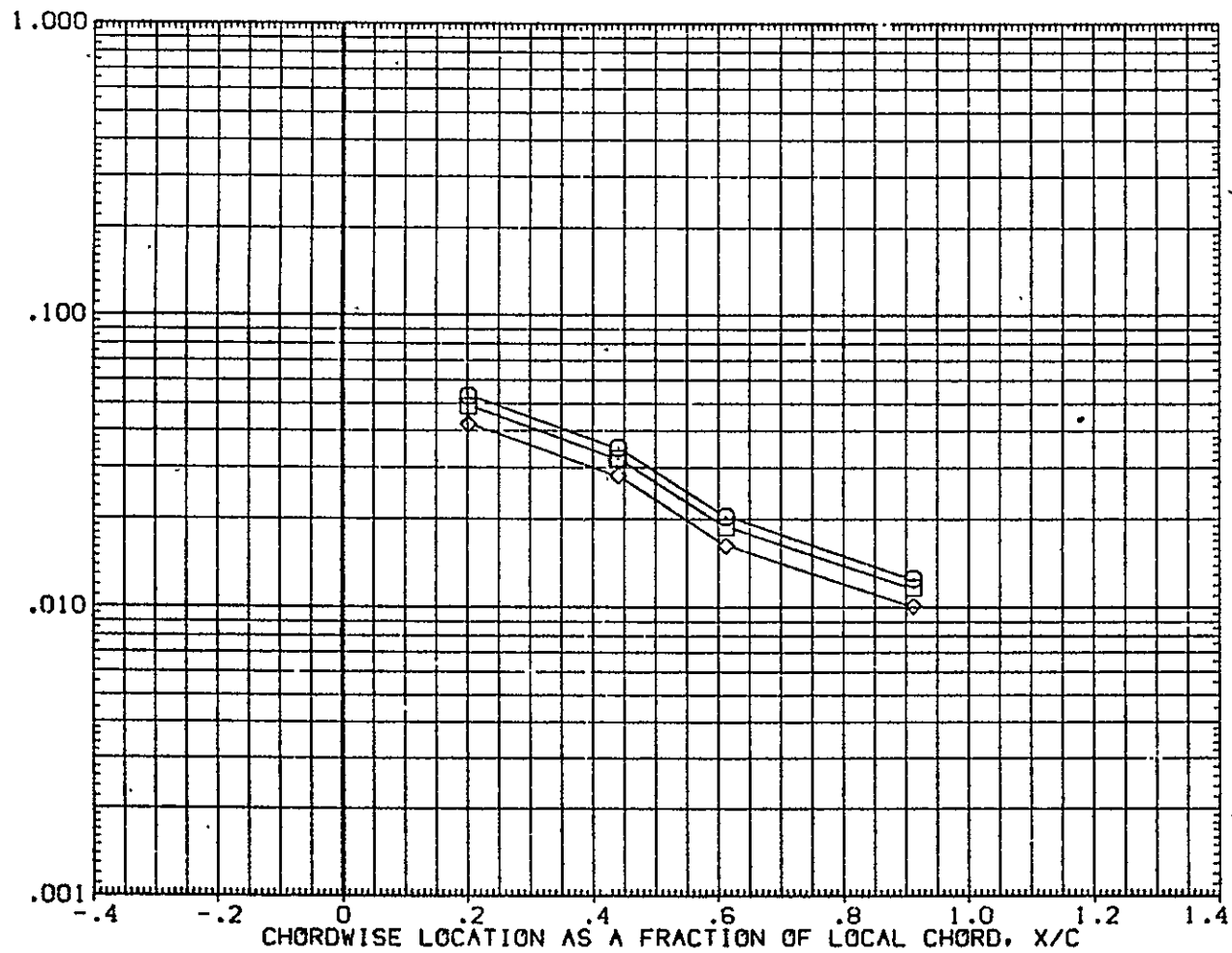


FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER $\alpha = 0$

CH12/IH21 (CAL HST 173-100) 37 0

WING L.S.(RUGW07)

SYMBOL
◇ □ ○

| HAW/HT | ZY/B | MACH |
|--------|------|-------|
| .850 | .750 | 7.614 |
| .900 | | |
| 1.000 | | |

| PARAMETRIC VALUES | | |
|-------------------|------|------|
| ALPHA | BETA | |
| .000 | .000 | .000 |

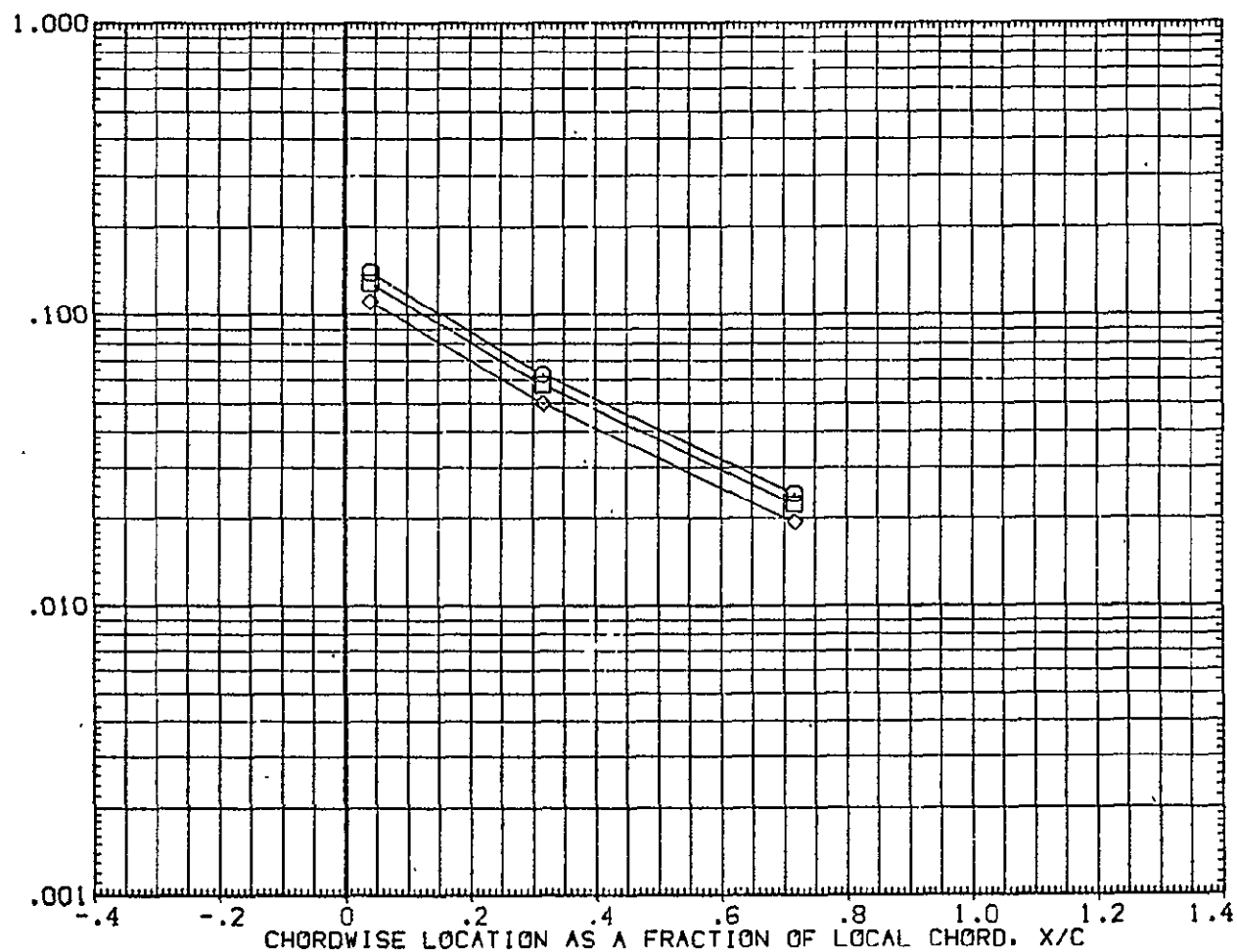
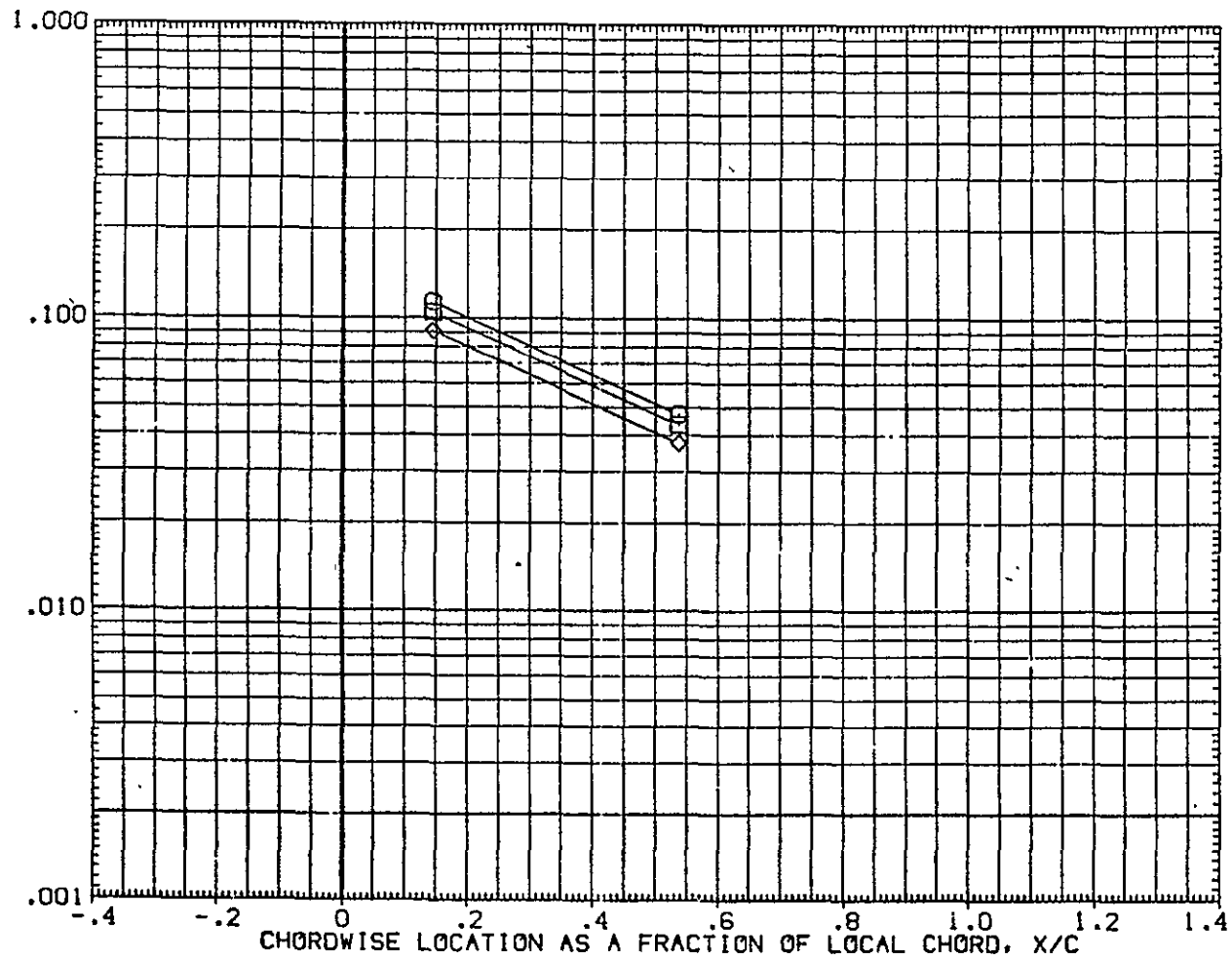
RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF} 

FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER ALPHA = 0

OH12/IH21 (CAL HST 173-100) 37 0

WING L.S.(RUGW07)

| SYMBOL | HAW/HT | 2Y/B | MACH | PARAMETRIC VALUES | | |
|--------|--------|------|-------|-------------------|------|--|
| | | | | ALPHA | BETA | |
| ○ | .850 | .950 | 7.614 | | | |
| ◇ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, h/h_{REF} FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER $\alpha = 0$

OH12/IH21 (CAL HST 173-100) 37 0

WING L.S. (RUGW07)

| SYMBOL | HAW/HT | 2Y/B | MACH | PARAMETRIC VALUES | | |
|--------|--------|------|--------|-------------------|------|--|
| | | | | ALPHA | BETA | |
| □ | .850 | .250 | 16.060 | .000 | | |
| ◇ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

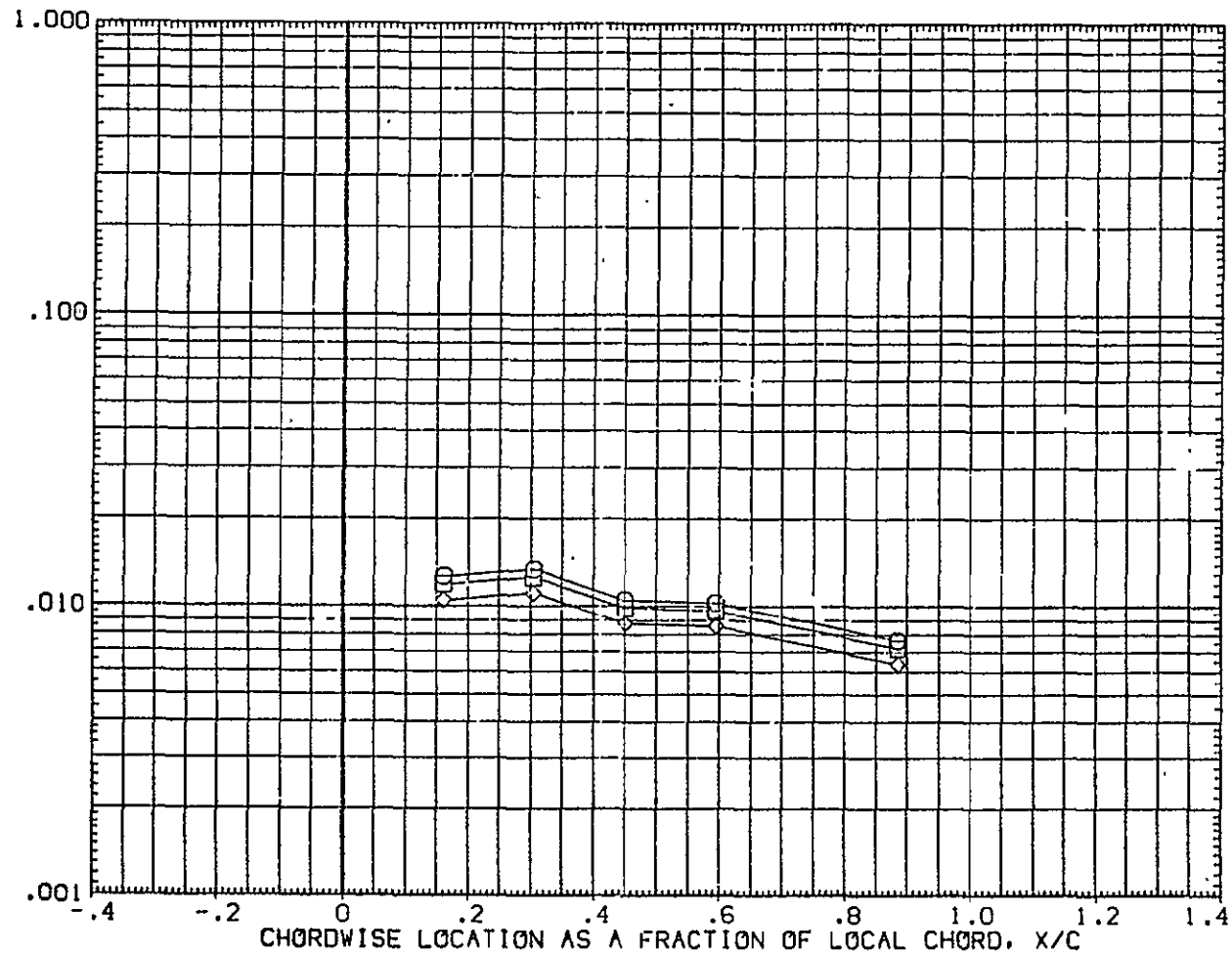
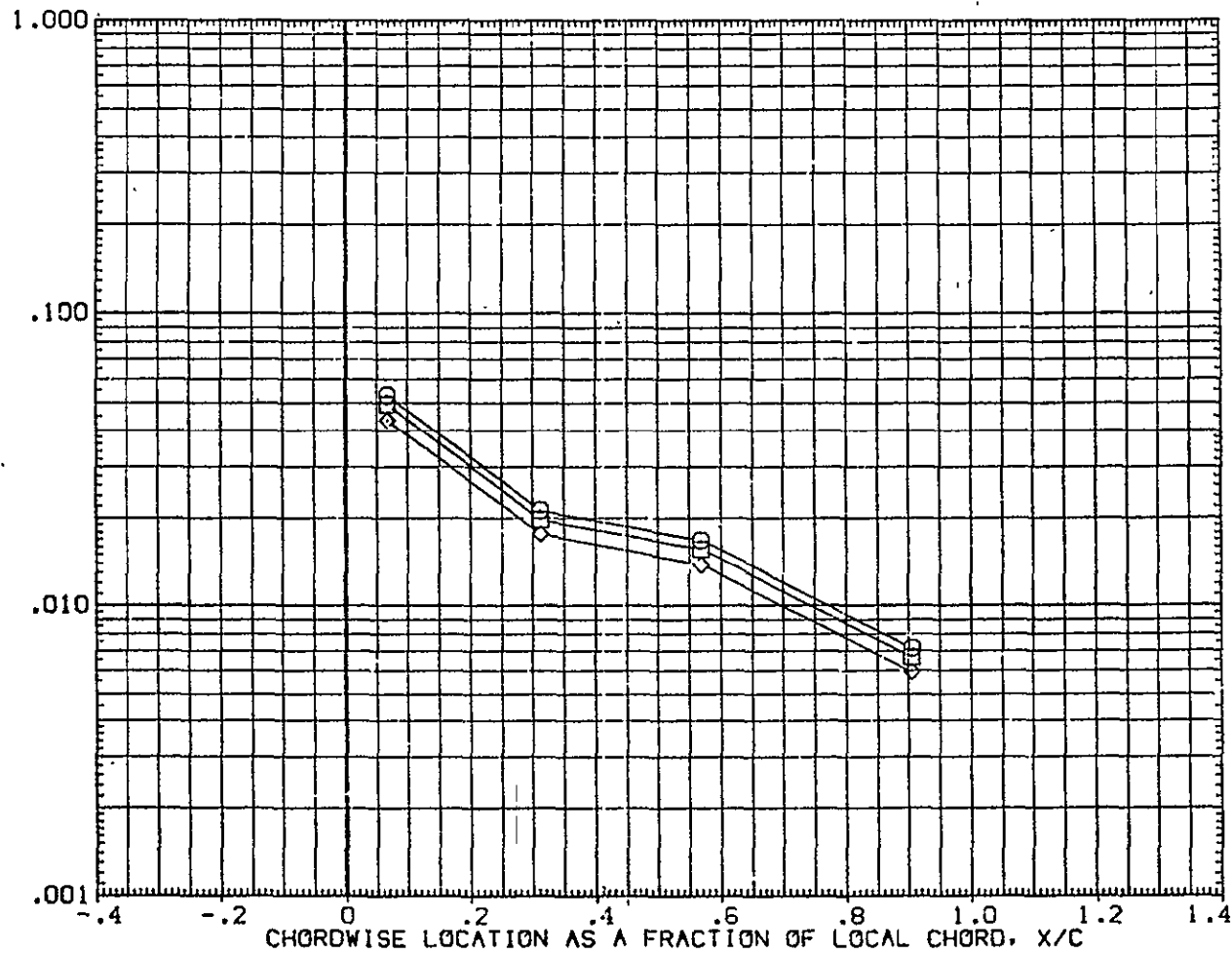


FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER ALPHA = 0

0H12/IH21 (CAL HST 173-100) 37 0

WING L.S.(RUGW07)

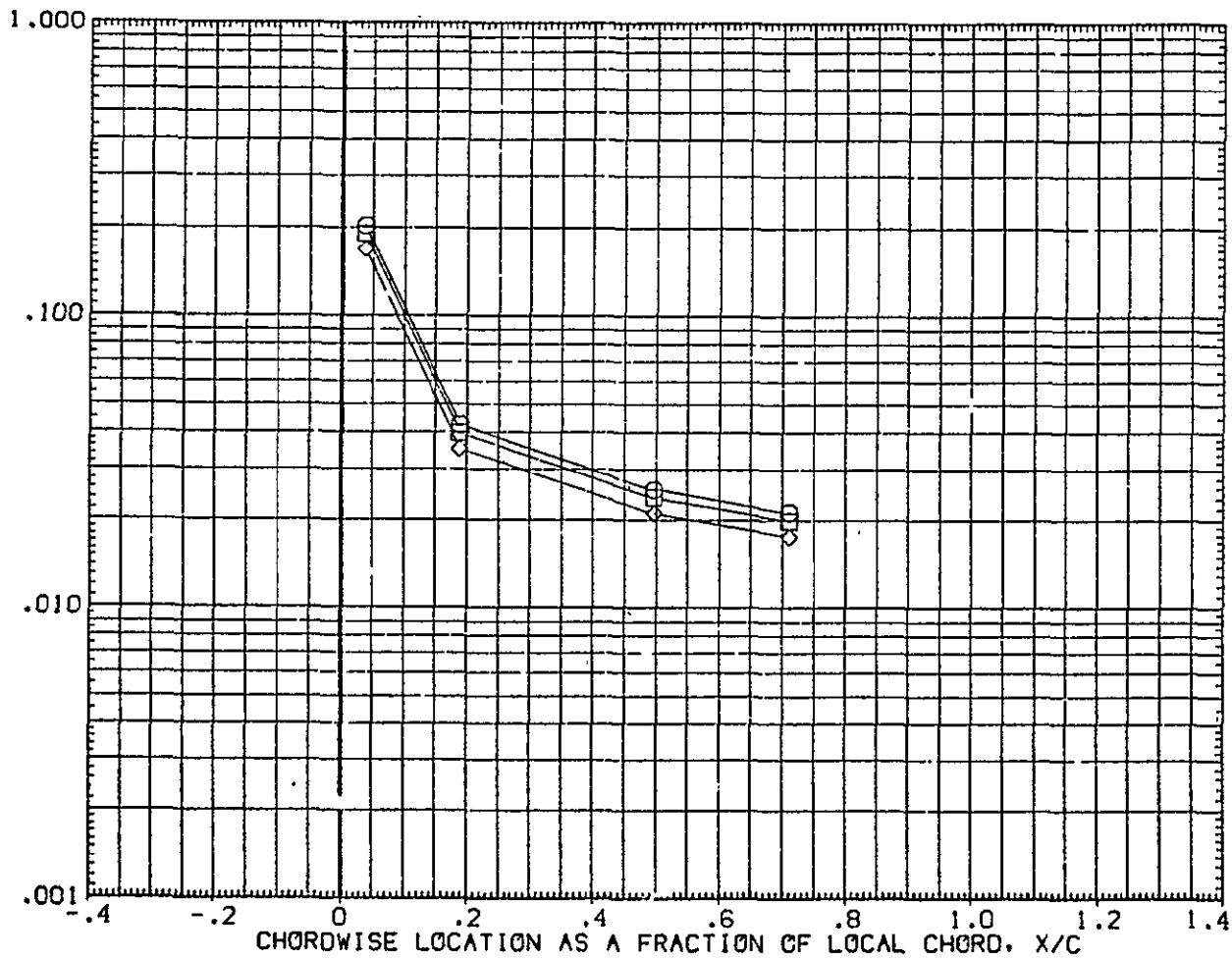
| SYMBOL | HAW/HT | ZY/B | MACH | PARAMETRIC VALUES | | |
|--------|--------|------|--------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| ◇ | .850 | .400 | 15.060 | .000 | | .000 |
| □ | .900 | | | | | |
| ○ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF} FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER $\alpha = 0$

OH12/IH21 (CAL HST 173-100) 37 0

WING L.S.(RUGW07)

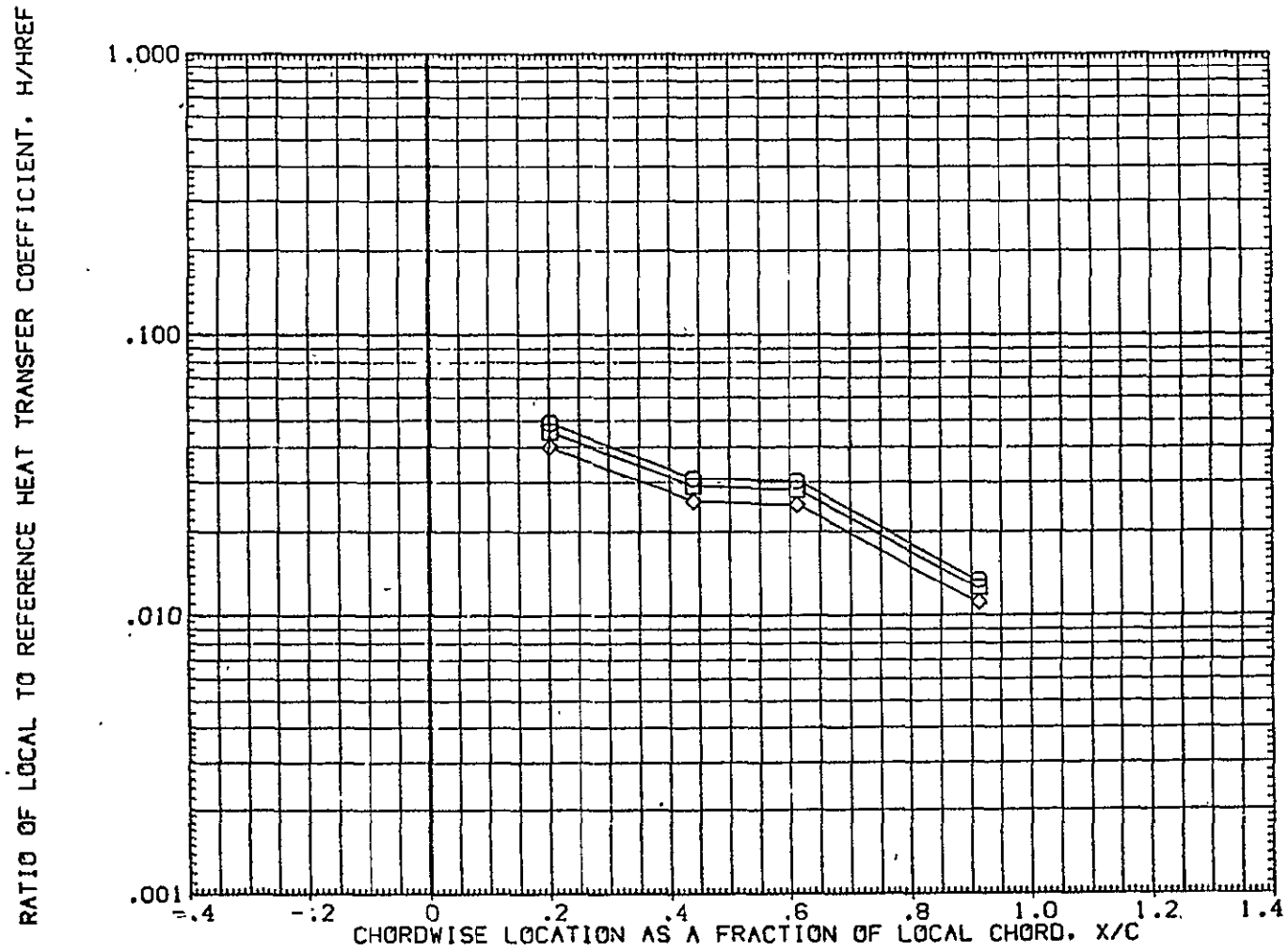
| SYMBOL | HAW/HT | ZV/B | MACH | PARAMETRIC VALUES | | |
|--------|--------|------|--------|-------------------|------|--|
| | | | | ALPHA | BETA | |
| □ | .850 | .500 | 16.060 | .000 | | |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF} FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER $\alpha = 0$

0H12/1H21 (CAL HST 173-100) 37 0

WING L.S.(RUGWD7)

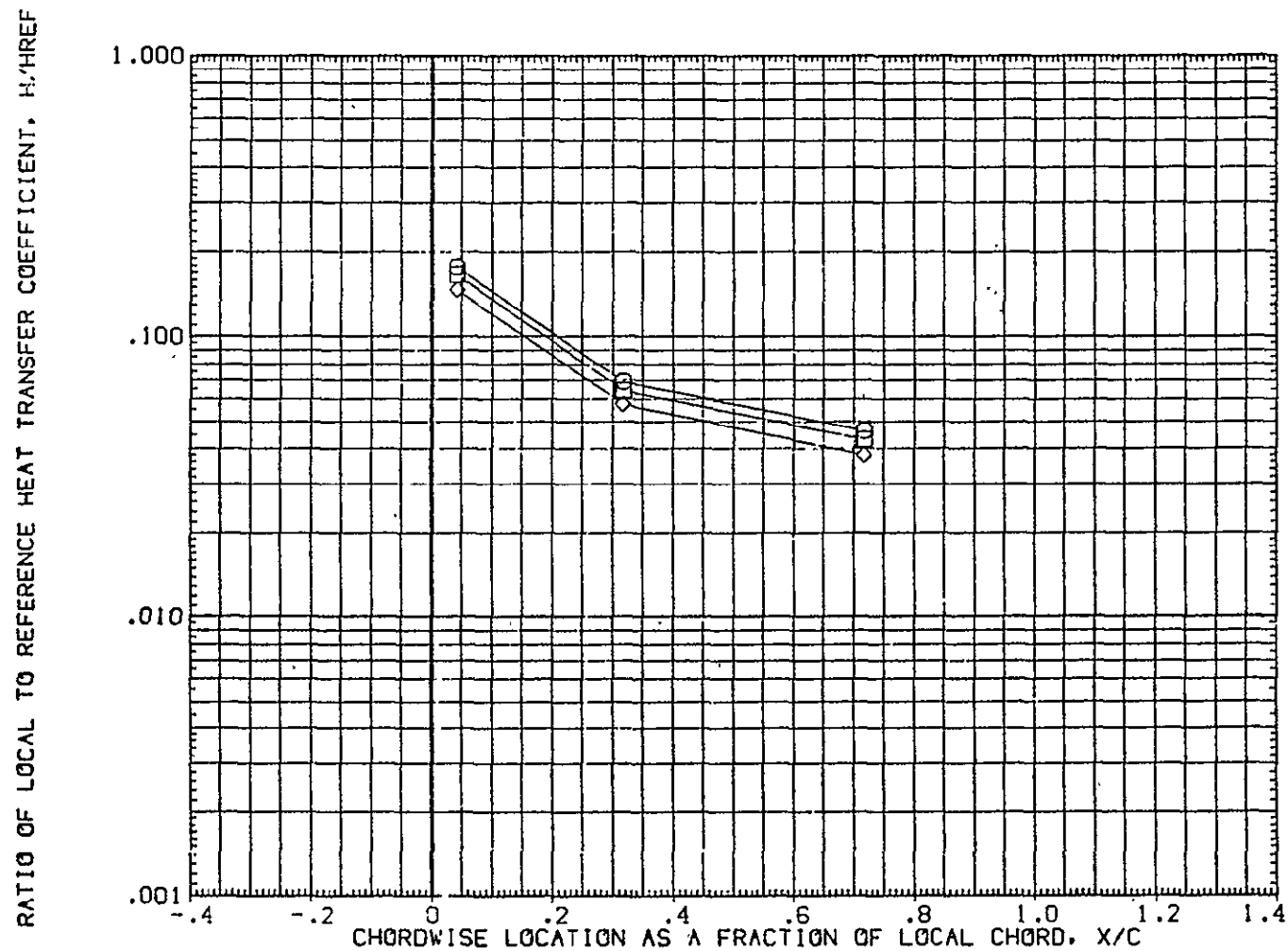
| SYMBOL | HAW/HT | ZY/B | PACH | PARAMETRIC VALUES | | |
|--------|--------|------|--------|-------------------|------|--|
| | | | | ALPHA | BETA | |
| ○ | .850 | .600 | 16.060 | .000 | | |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER $\alpha = 0$

OH12/IH21 (CAL HST 173-100) 37 0

WING L.S. (RUGW07)

| SYMBOL | HAW/HT | ZY/B | MACH | ALPHA | PARAMETRIC VALUES | |
|--------|--------|------|--------|-------|-------------------|------|
| ○ | .850 | .750 | 16.060 | .000 | BETA | .000 |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER $\alpha = 0$

0H12/1H21 (CAL HST 173-100) 37 0

WING L.S.(RUGW07)

| SYMBOL | HAW/HT | 2Y/B | MACH | PARAMETRIC VALUES | | |
|--------|--------|------|--------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| ○ | .850 | .950 | 16.060 | .000 | | .000 |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

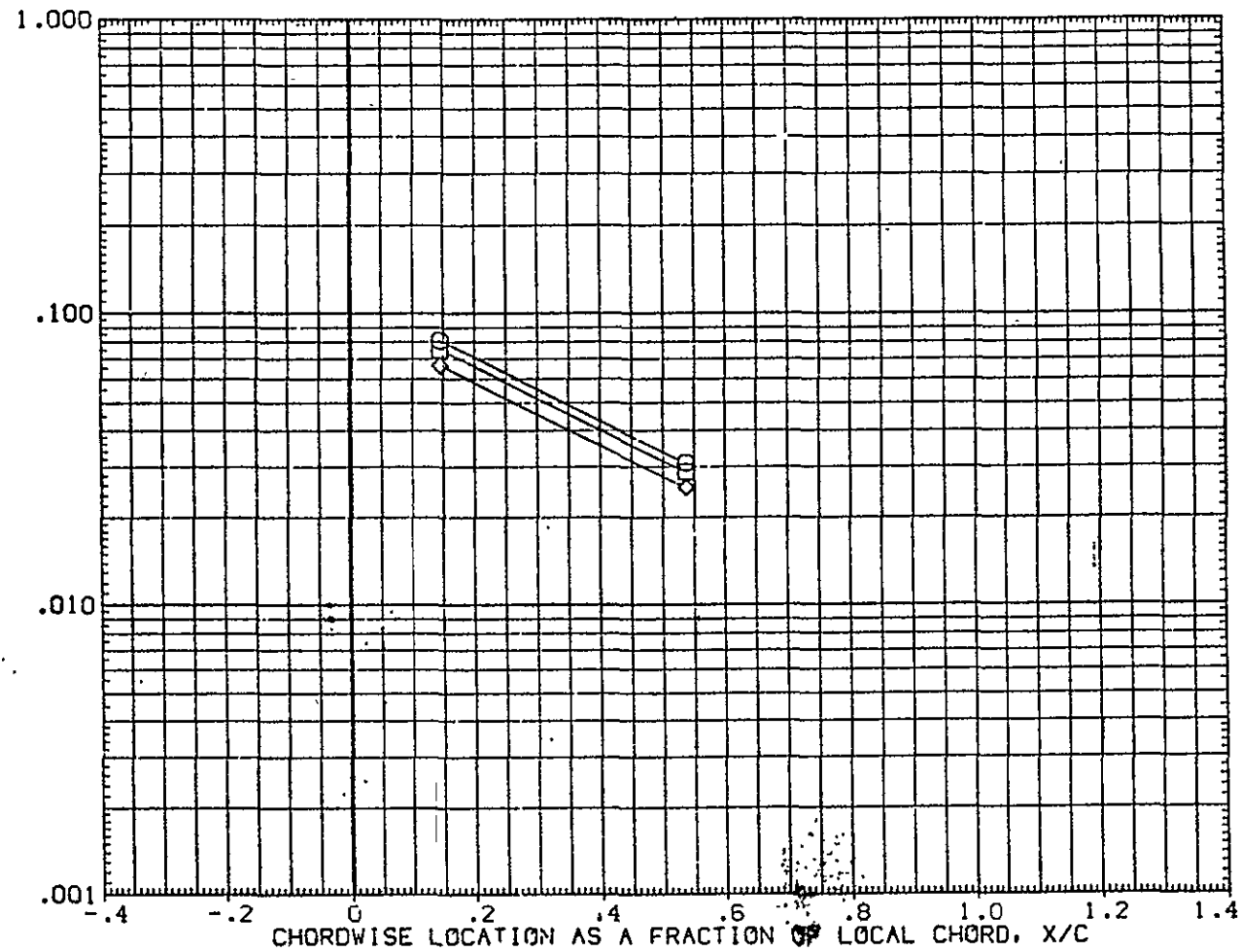
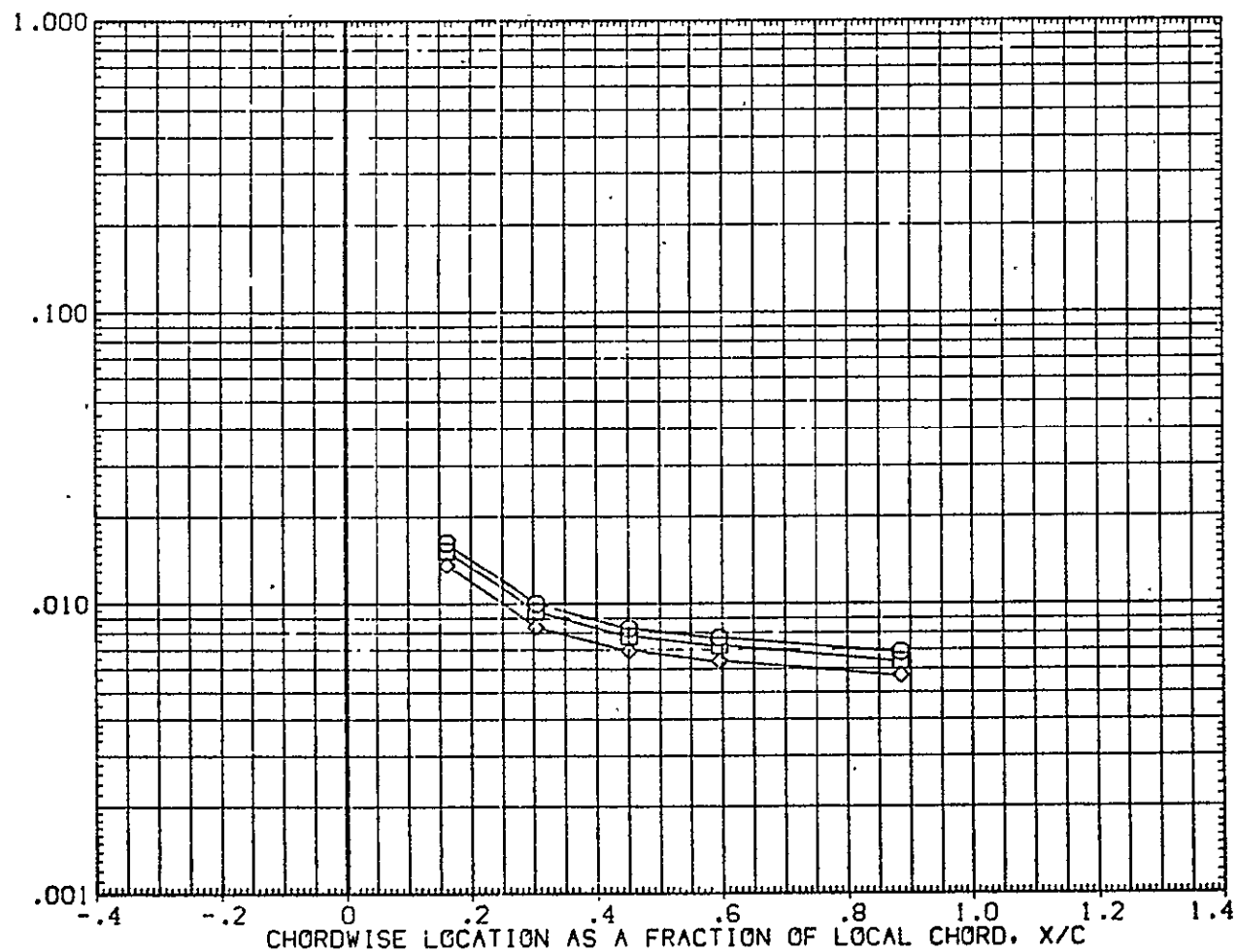
RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF} 

FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER ALPHA = 0

0H12/IH21 (CAL HST 173-100) 37 0

WING L.S. (RUGW07)

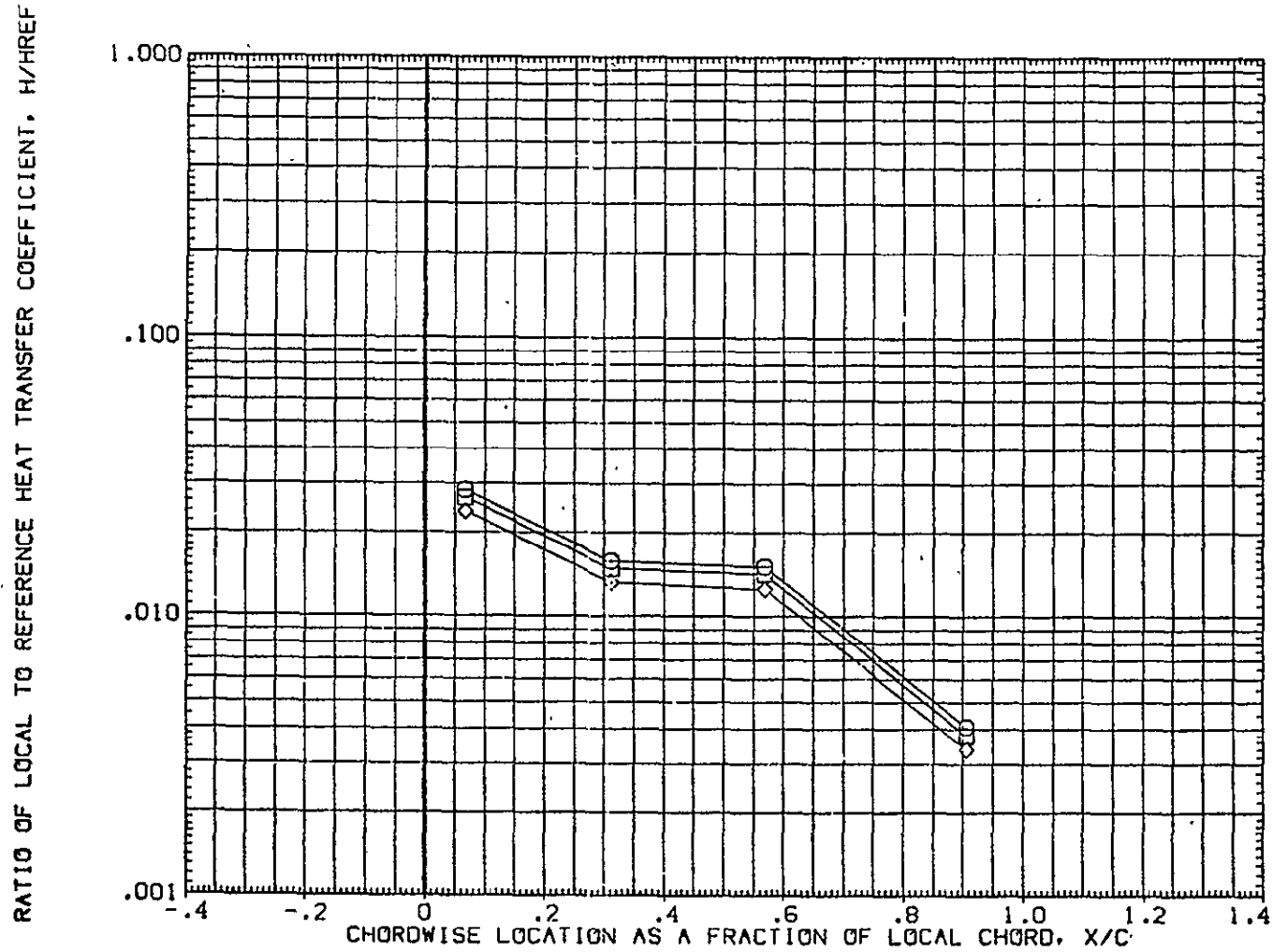
| SYMBOL | HAW/HT | 2Y/B | MACH | PARAMETRIC VALUES | | |
|--------|--------|------|--------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| ○ | .850 | .250 | 18.310 | .000 | .000 | .000 |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF} FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER $\alpha = 0$

OH12/IH21 (CAL HST 173-100) 37 0

WING L.S. (RUGW07)

| SYMBOL | HAW/HT | 2Y/B | MACH | PARAMETRIC VALUES | | |
|--------|--------|------|--------|-------------------|------|--|
| | | | | ALPHA | BETA | |
| ○ | .850 | .400 | 18.310 | .000 | | |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER $\alpha \approx 0$

0H12/1H21 (CAL HST 173-100) 37 0

WING L.S.(RUGW07)

| SYMBOL | HAW/HT | 2Y/B | PACH | ALPHA | PARAMETRIC VALUES | BETA |
|--------|--------|------|--------|-------|-------------------|------|
| ○ | .850 | .500 | 18.310 | .000 | | .000 |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

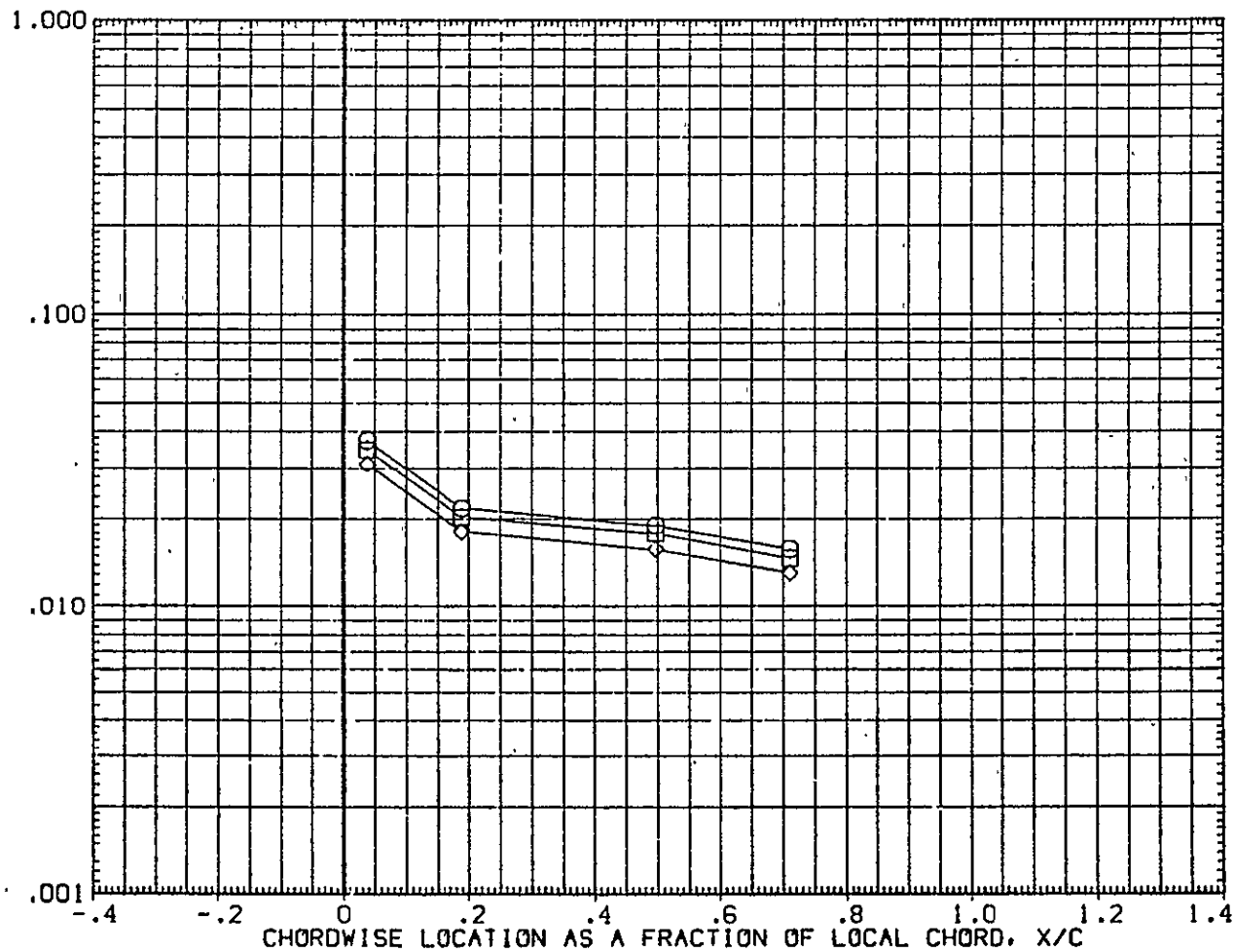


FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER $\alpha = 0$

REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR

OH12/IH21 (CAL HST 173-100) 37 0

WING L.S.(RUGW07)

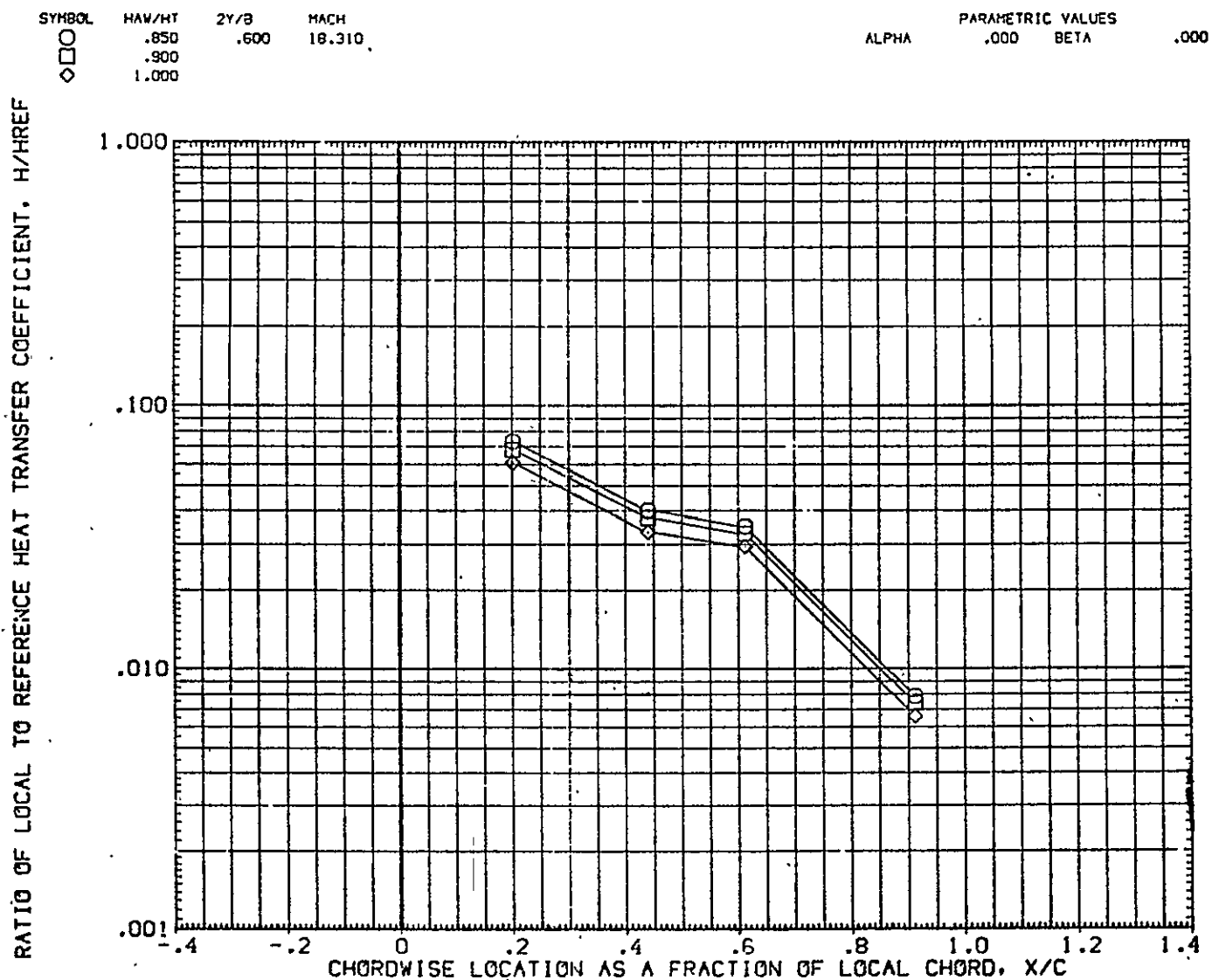


FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER $\alpha = 0$

OH12/1H21 (CAL HST 173-100) 37 0

WING L.S.(RUGW07)

| SYMBOL | HAW/HT | 2Y/B | MACH | PARAMETRIC VALUES | | |
|--------|--------|------|--------|-------------------|------|------|
| ◇ | .850 | .750 | 18.310 | ALPHA | .000 | BETA |
| □ | .800 | | | | | .000 |
| ◇ | 1.000 | | | | | |

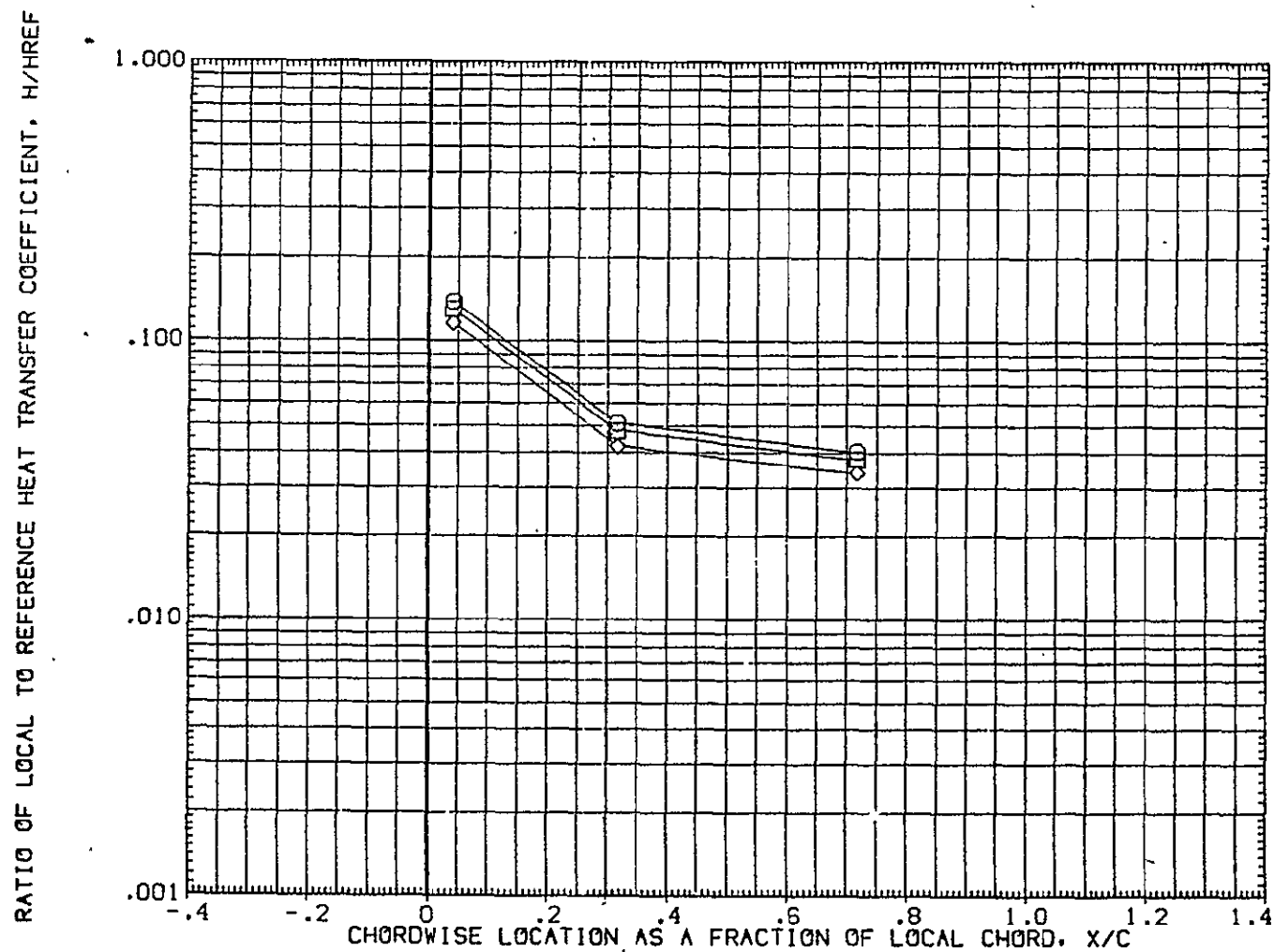
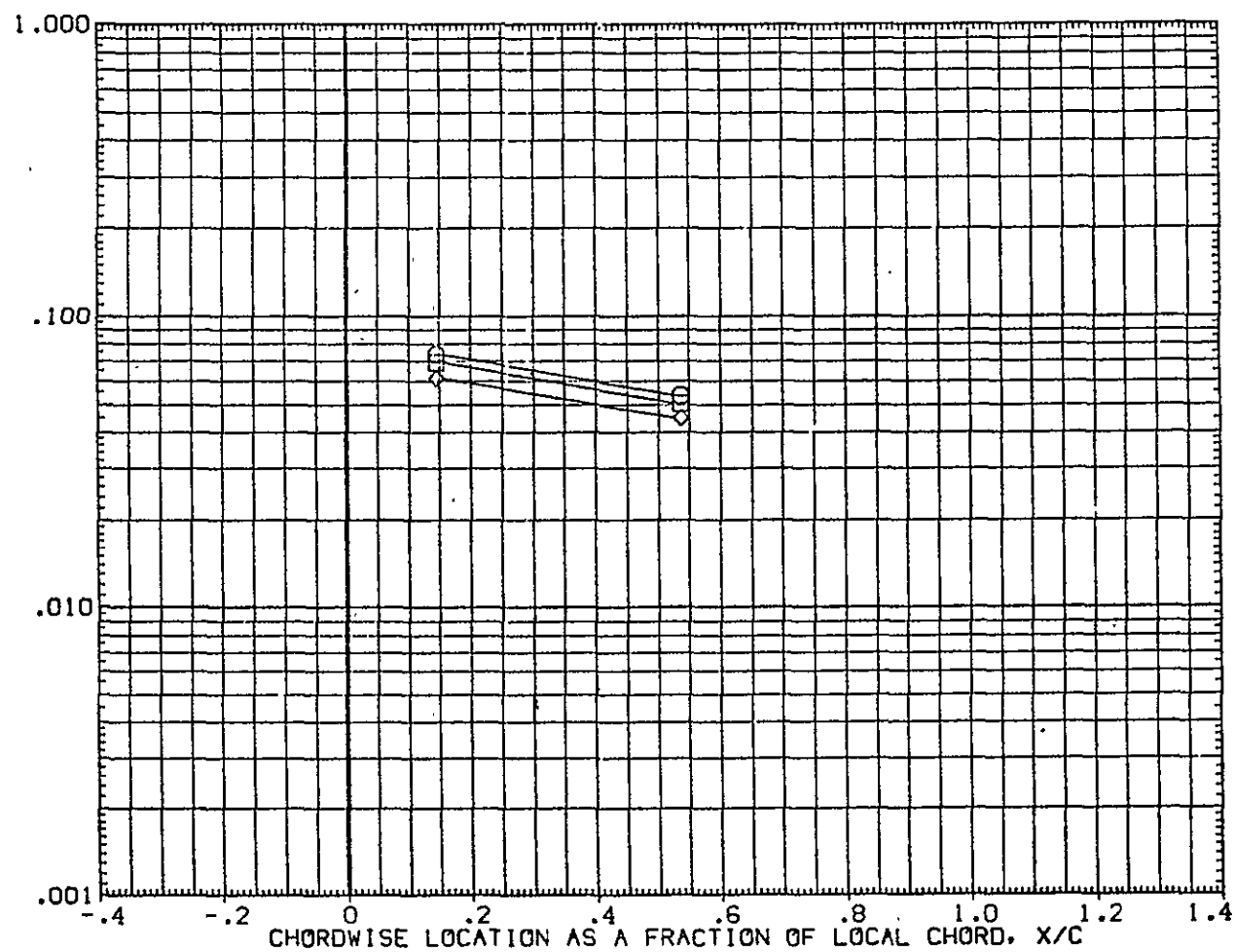


FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER ALPHA = 0

0H12/IH21 (CAL HST 173-100) 37 0

WING L.S.(RUGW07)

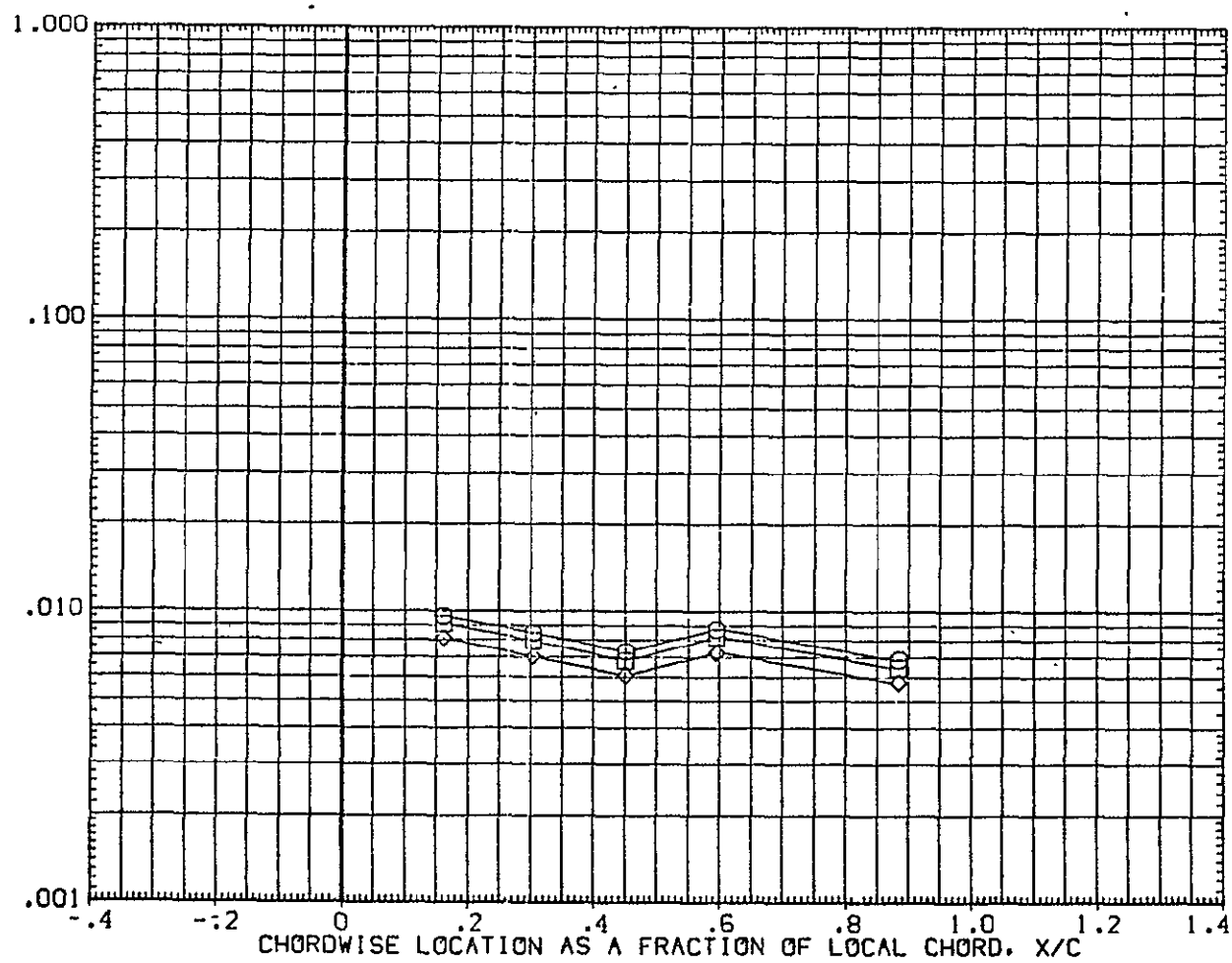
| SYMBOL | HAW/HT | ZY/B | MACH | PARAMETRIC VALUES | | |
|--------|--------|------|--------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| ◇ | .850 | .950 | 18.310 | .000 | .000 | .000 |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF} FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER $\alpha = 0$

OH12/1H21 (CAL HST 173-100) 37 0

WING L.S. (RUGW07)

| SYMBOL | HAW/HT | 2Y/B | MACH | PARAMETRIC VALUES | | |
|--------|--------|------|--------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| ◇ | .850 | .250 | 19.190 | .000 | .000 | .000 |
| □ | .900 | | | | | |
| □ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF} FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER $\alpha = 0$

OH12/IH21 (CAL HST 173-100) 37 0

WING L.S.(RUGW07)

SYMBOL
○
□
◇

HAW/HT
.850
.900
1.000

ZY/B
.400

MACH
19.190

ALPHA

PARAMETRIC VALUES

.000

BETA

.000

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

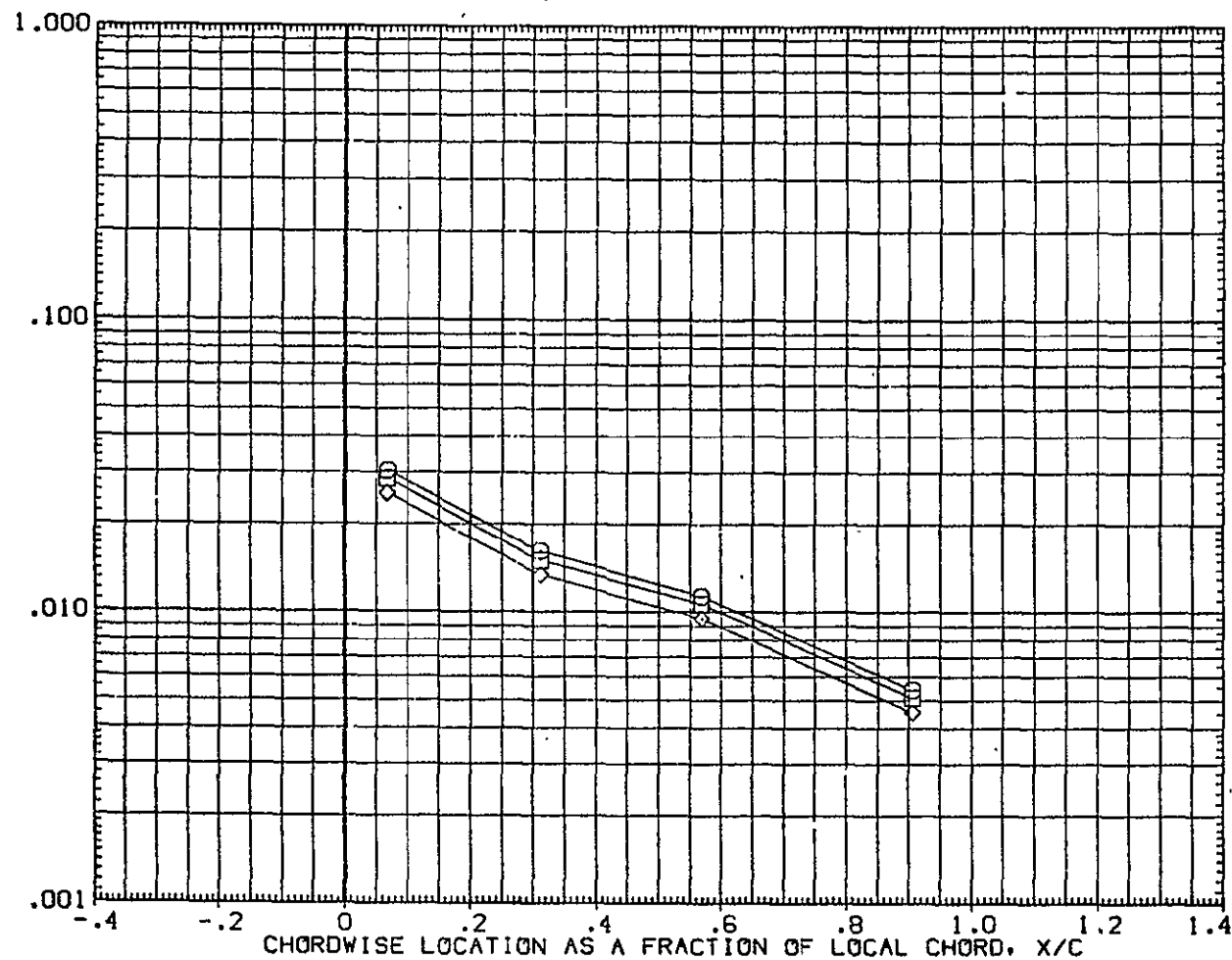


FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER ALPHA = 0

OH12/IH21 (CAL HST 173-100) 37 0

WING L.S.(RUGW07)

| | | | | | | |
|--------|--------|------|--------|-------------------|------|------|
| SYMBOL | HAW/HT | ZY/B | MACH | PARAMETRIC VALUES | | |
| □ | .850 | .500 | 19.190 | ALPHA | .000 | BETA |
| ◇ | .900 | | | | | |
| | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

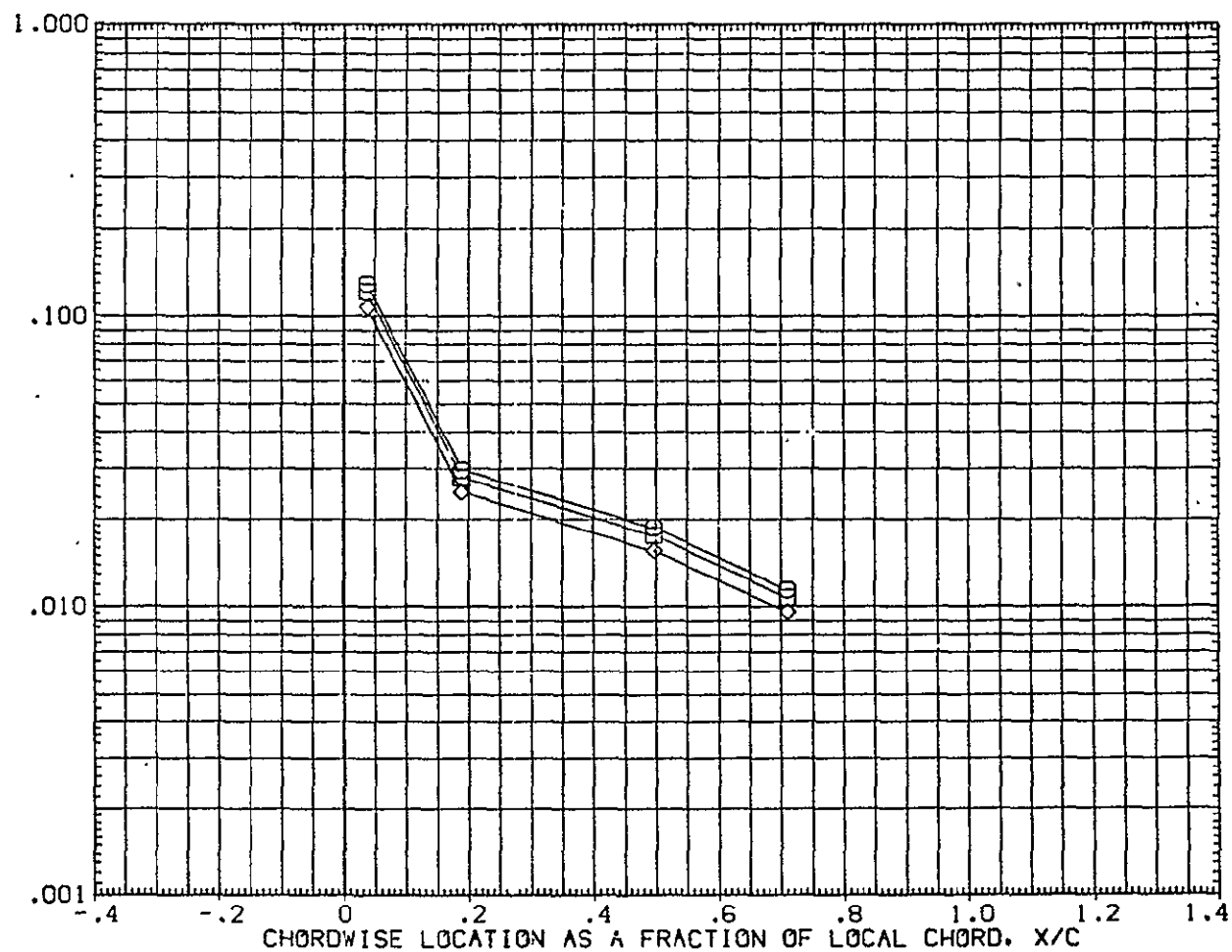


FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER $\alpha = 0$

0H12/IH21 (CAL HST 173-100) 37 0

WING L.S. (RUGW07)

SYMBOL

HAW/HT

2Y/B

MACH

PARAMETRIC VALUES

ALPHA

.000

BETA

.000

◇ □ ○

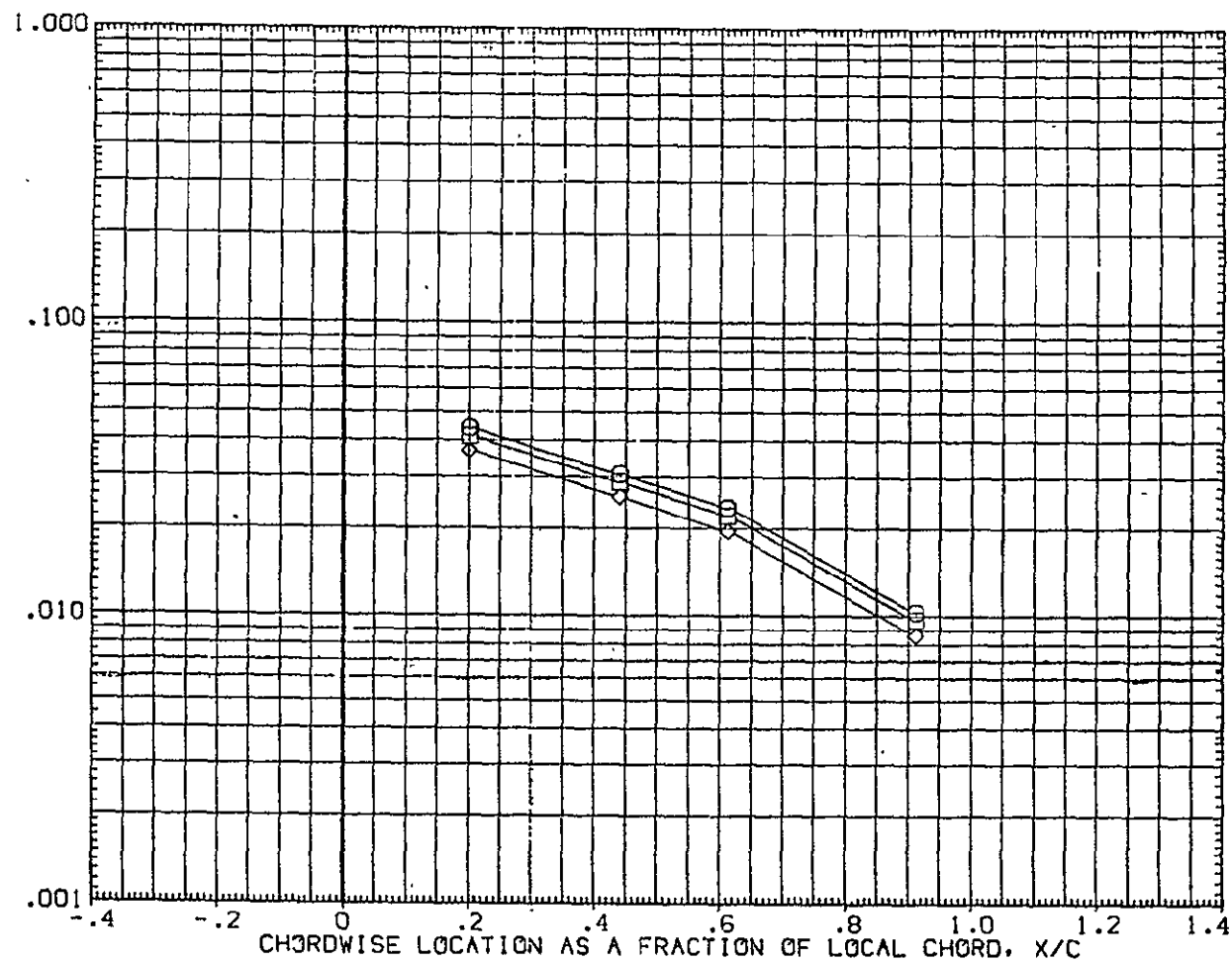
.850
.900
1.000RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, h/h_{REF} 

FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER ALPHA = 0

OH12/IH21 (CAL HST 173-100) 37 0

WING L.S.(RUGW07)

| SYMBOL | HAW/HT | ZY/B | MACH | PARAMETRIC VALUES | | |
|--------|--------|------|--------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| □ | .850 | .750 | 19.190 | .000 | .000 | .000 |
| ◇ | .900 | | | | | |
| | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

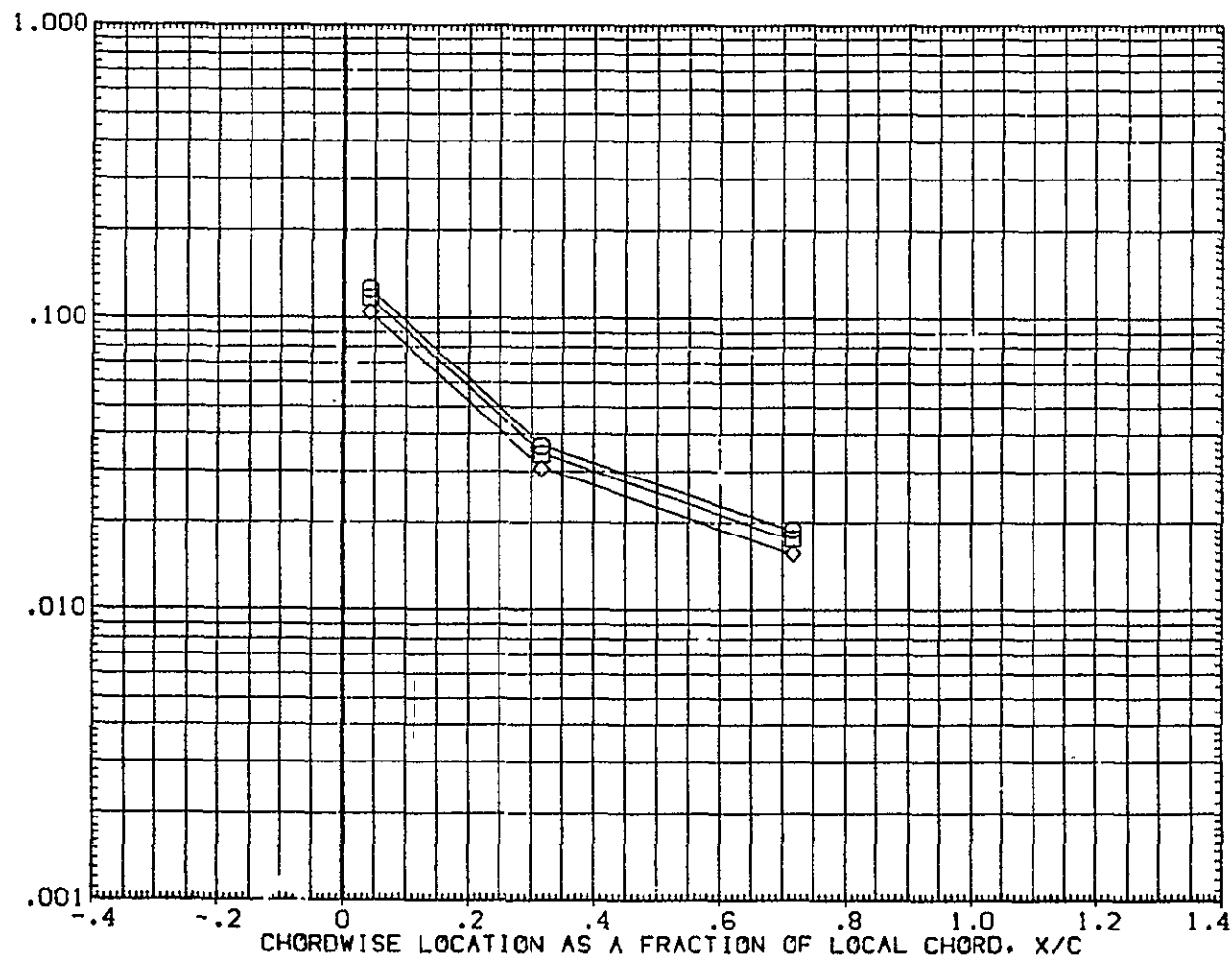


FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER $\alpha = 0$

OH12/IH21 (CAL HST 173-100) 37 0

WING L.S.(RUGW07)

| SYMBOL | HAW/HT | ZY/B | MACH | PARAMETRIC VALUES | | |
|--------|--------|------|--------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| ◇ | .850 | .950 | 19.190 | .000 | .000 | .000 |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

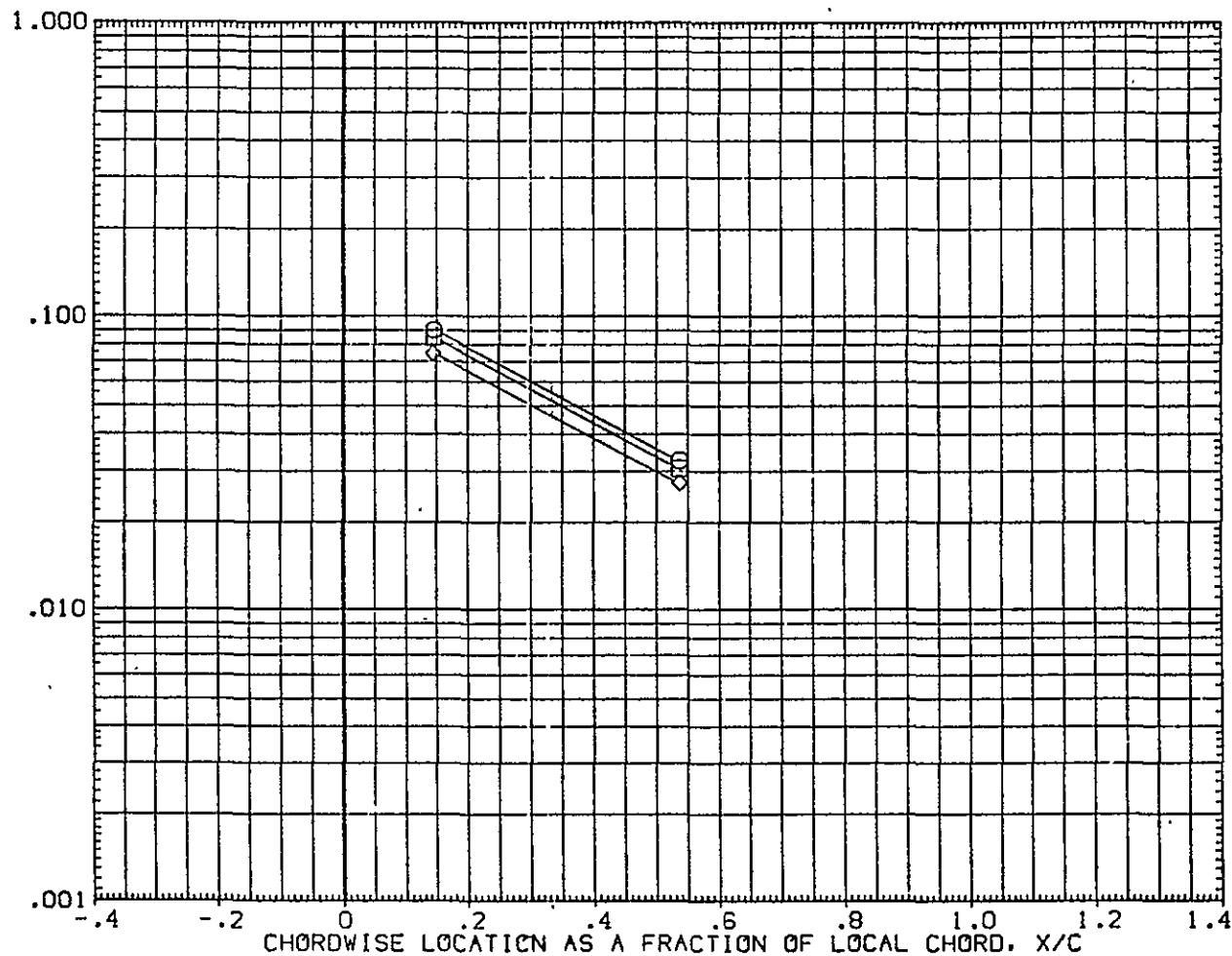


FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER $\alpha = 0$

0H12/1H21 (CAL HST 173-100) 37 0 T WING L.S.(RUGW05)

| | | | | | | |
|--------|--------|------|-------|-------------------|------|------|
| SYMBOL | HAW/HT | 2Y/8 | MACH | PARAMETRIC VALUES | | |
| ◇ | .850 | .250 | 6.999 | ALPHA | .000 | BETA |
| □ | .900 | | | | | .000 |
| ○ | 1.000 | | | | | |

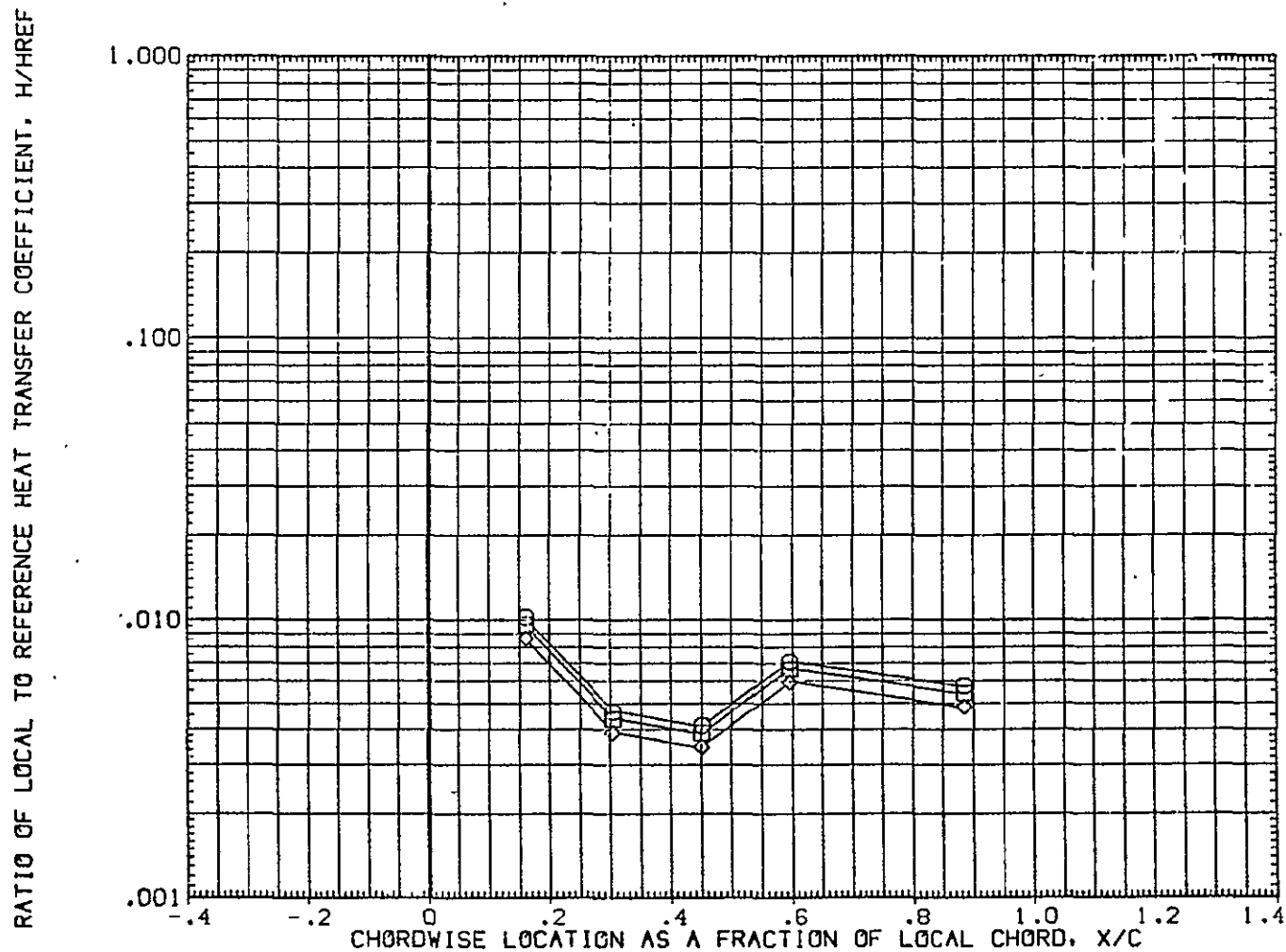


FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER $\alpha^* = 0$

OH12/IH21 (CAL HST 173-100) 37 0 T WING L.S.(RUGW05)

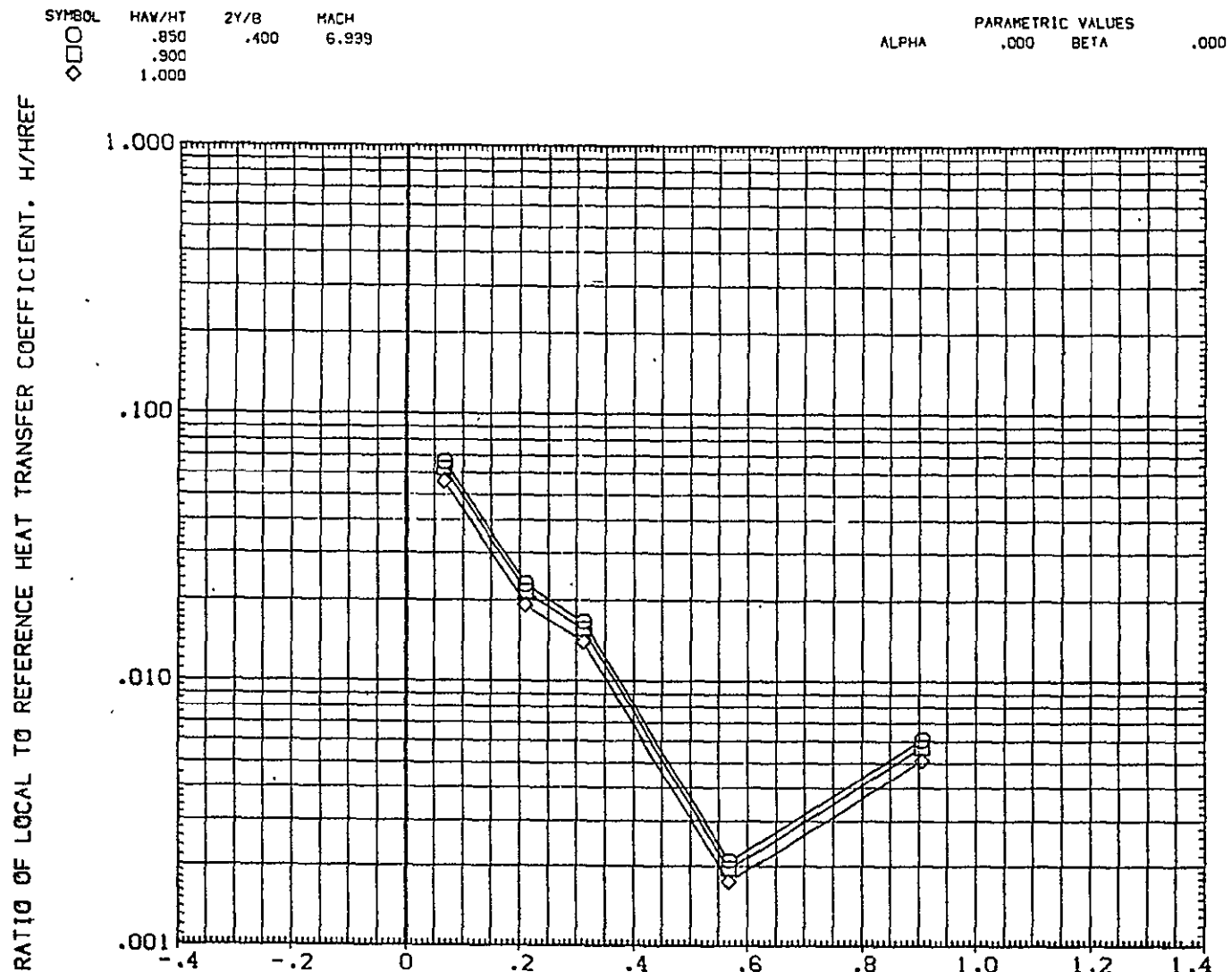


FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER $\alpha = 0$

OH12/IH21 (CAL HST 173-100) 37 0 T WING L.S.(RUGW05)

| SYMBOL | HAW/HT | 2Y/B | MACH | PARAMETRIC VALUES |
|--------|--------|------|-------|----------------------|
| ○ | .850 | .500 | 6.999 | ALPHA .000 BETA .000 |
| □ | .900 | | | |
| ◇ | 1.000 | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

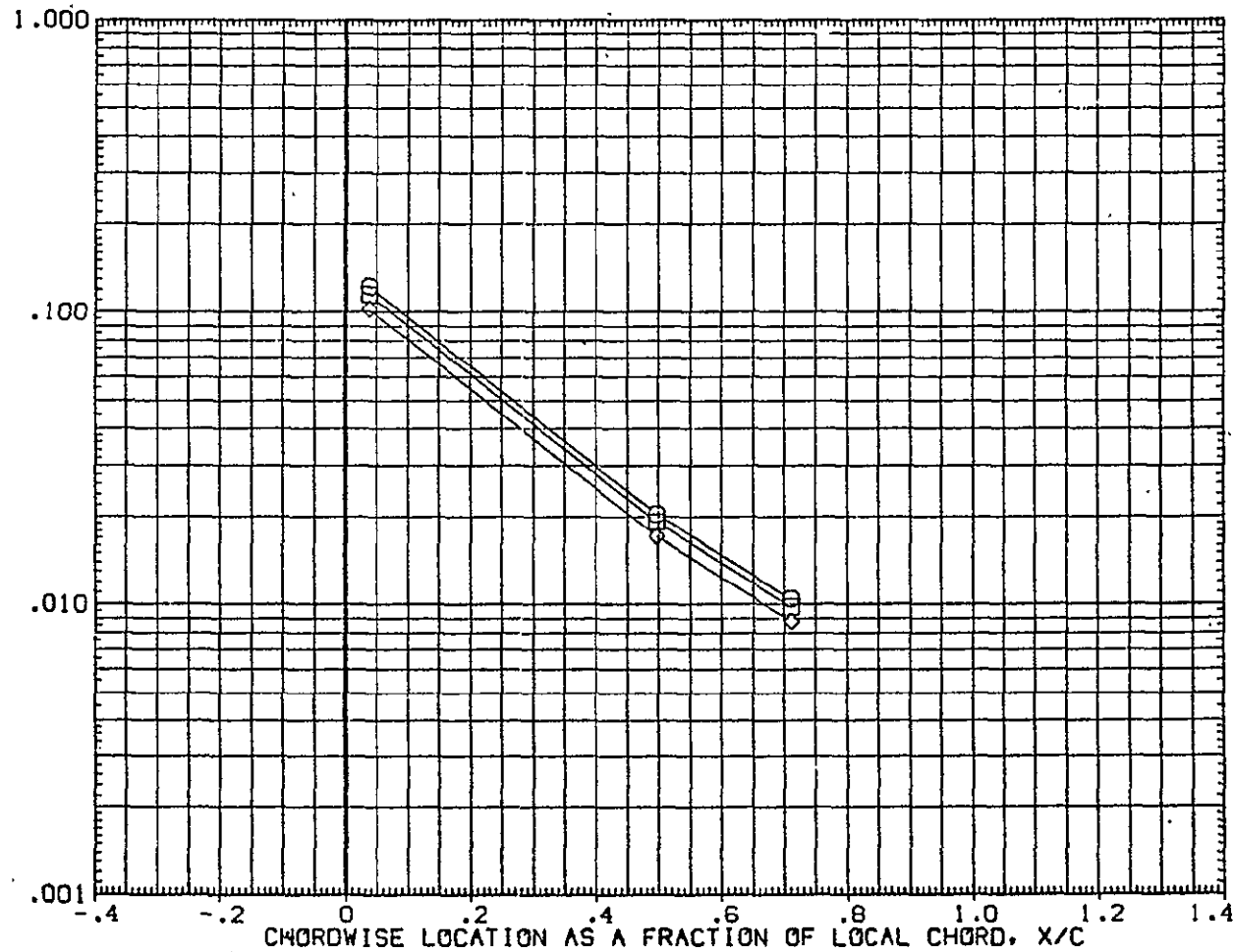


FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER ALPHA = 0

REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR

0H12/IH21 (CAL HST 173-100) 37 0 T WING L.S.(RUGW05)

| SYMBOL | HAW/HT | 2Y/B | MACH | PARAMETRIC VALUES | | |
|--------|--------|------|-------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| ◇ | .850 | .600 | 6.999 | .000 | BETA | .000 |
| □ | .900 | | | | | |
| ○ | 1.000 | | | | | |

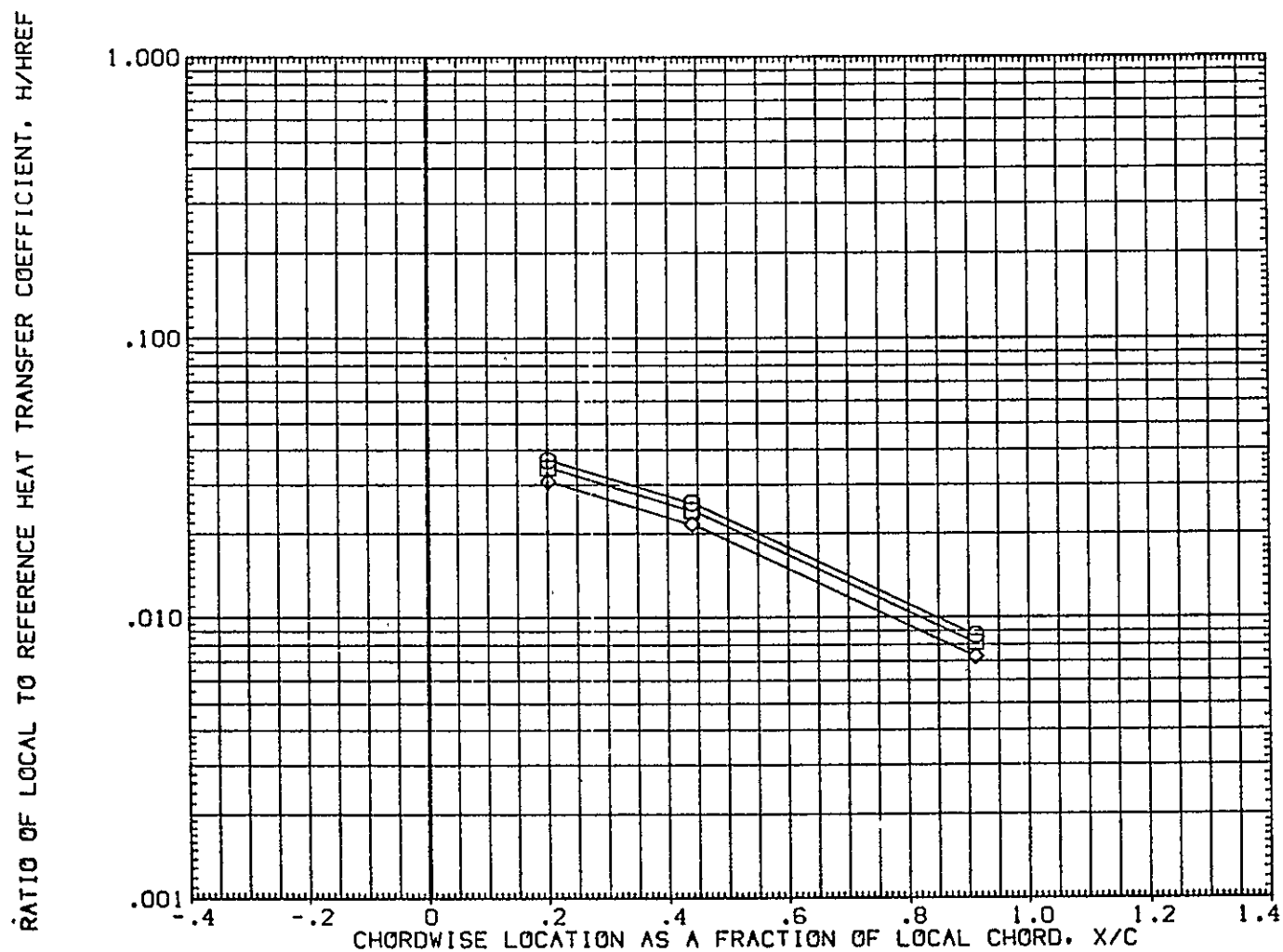


FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER ALPHA = 0

OH12/IH21 (CAL HST 173-100) 37 0 T WING L.S.(RUGW05)

| SYMBOL | HAW/HT | ZY/B | MACH | PARAMETRIC VALUES | | |
|--------|--------|------|-------|-------------------|------|--|
| | | | | ALPHA | BETA | |
| □ | .850 | .750 | 6.999 | .000 | .000 | |
| ◇ | .900 | | | | | |
| | 1.000 | | | | | |

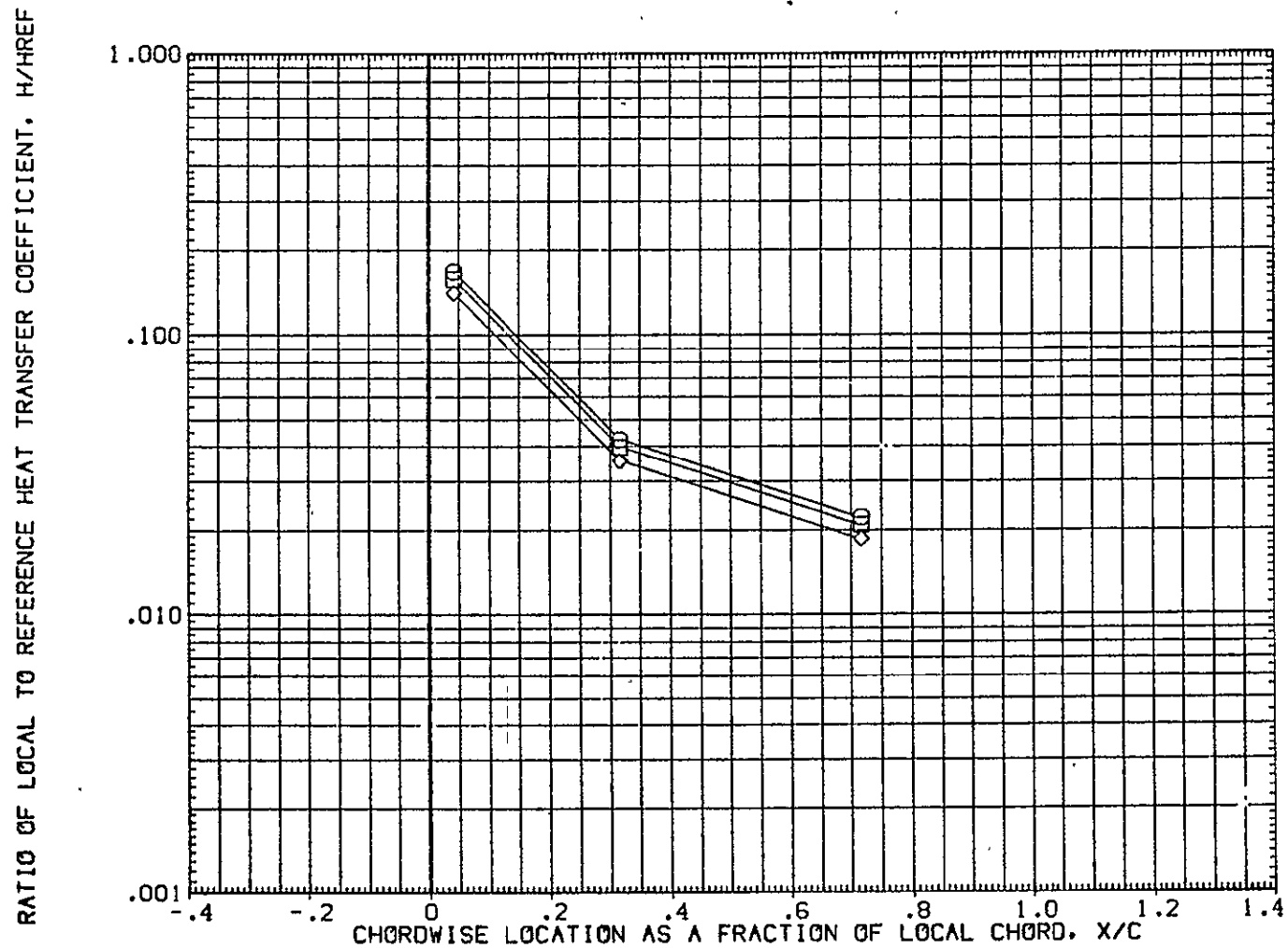


FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER $\alpha = 0$

OH12/IH21 (CAL HST 173-100) 37 0 T WING L.S.(RUGW05)

| SYMBOL | HAW/HT | 2Y/B | MACH | PARAMETRIC VALUES | | |
|--------|--------|------|-------|-------------------|------|--|
| | | | | ALPHA | BETA | |
| ◇ | .850 | .950 | 6.999 | .000 | | |
| ◇ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

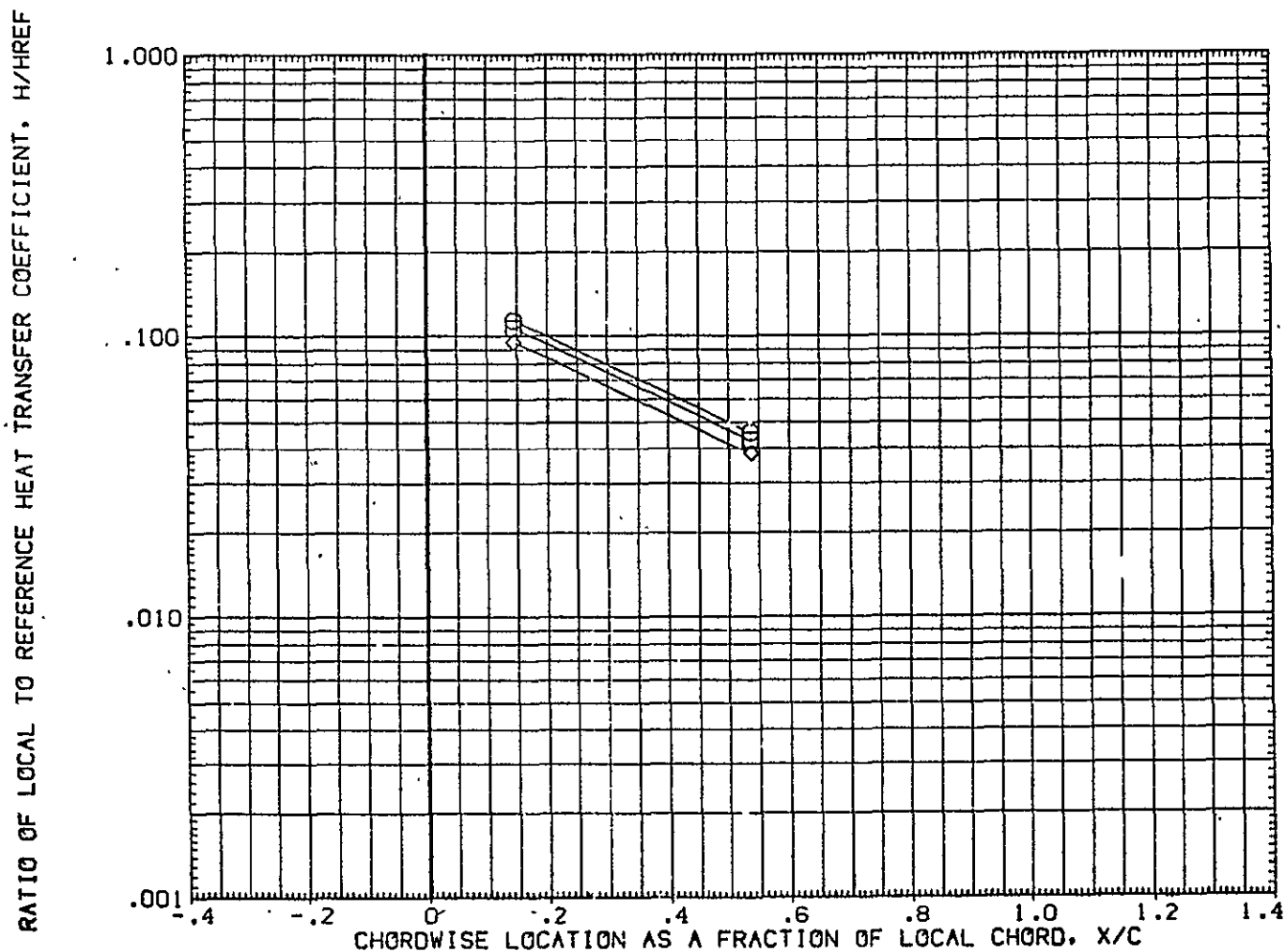


FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER ALPHA = 0

OH12/JH21 (CAL HST 173-100) 37 0 T WING L.S.(RUGW05)

| | | | | | | | |
|--------|--------|------|-------|-------|-------------------|--|------|
| SYMBOL | HAW/HT | 2Y/B | MACH | ALPHA | PARAMETRIC VALUES | | BETA |
| □ | .850 | .250 | 7.616 | | .000 | | .000 |
| ◇ | .900 | | | | | | |
| | 1.000 | | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

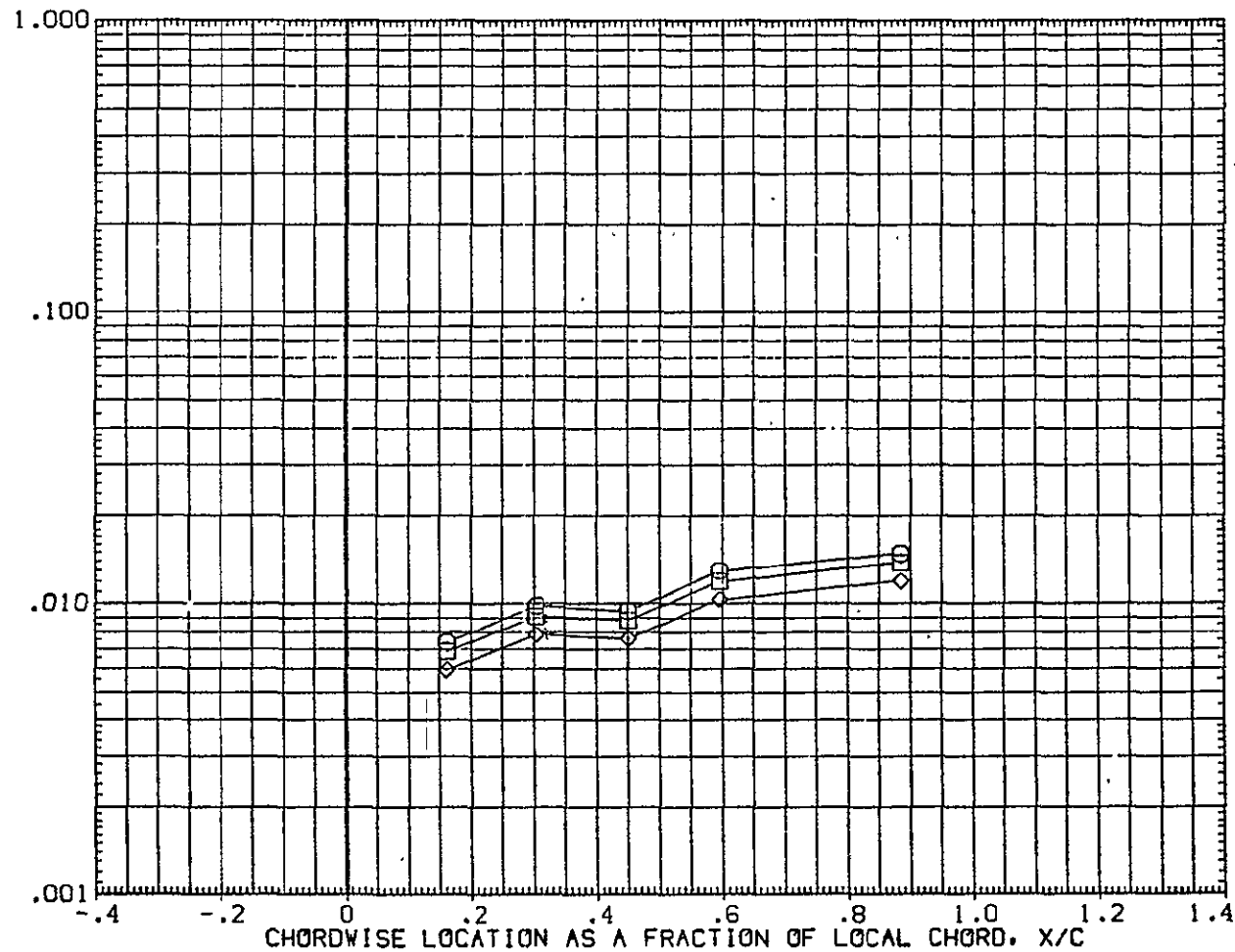


FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER ALPHA = 0

OH12/IH21 (CAL HST 173-100) 37 0 T WING L.S.(RUGW05)

| SYMBOL | HAW/HT | 2Y/B | MACH | PARAMETRIC VALUES | | |
|--------|--------|------|-------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| ◇ | .850 | .400 | 7.616 | .000 | | .000 |
| □ | .900 | | | | | |
| ○ | 1.000 | | | | | |

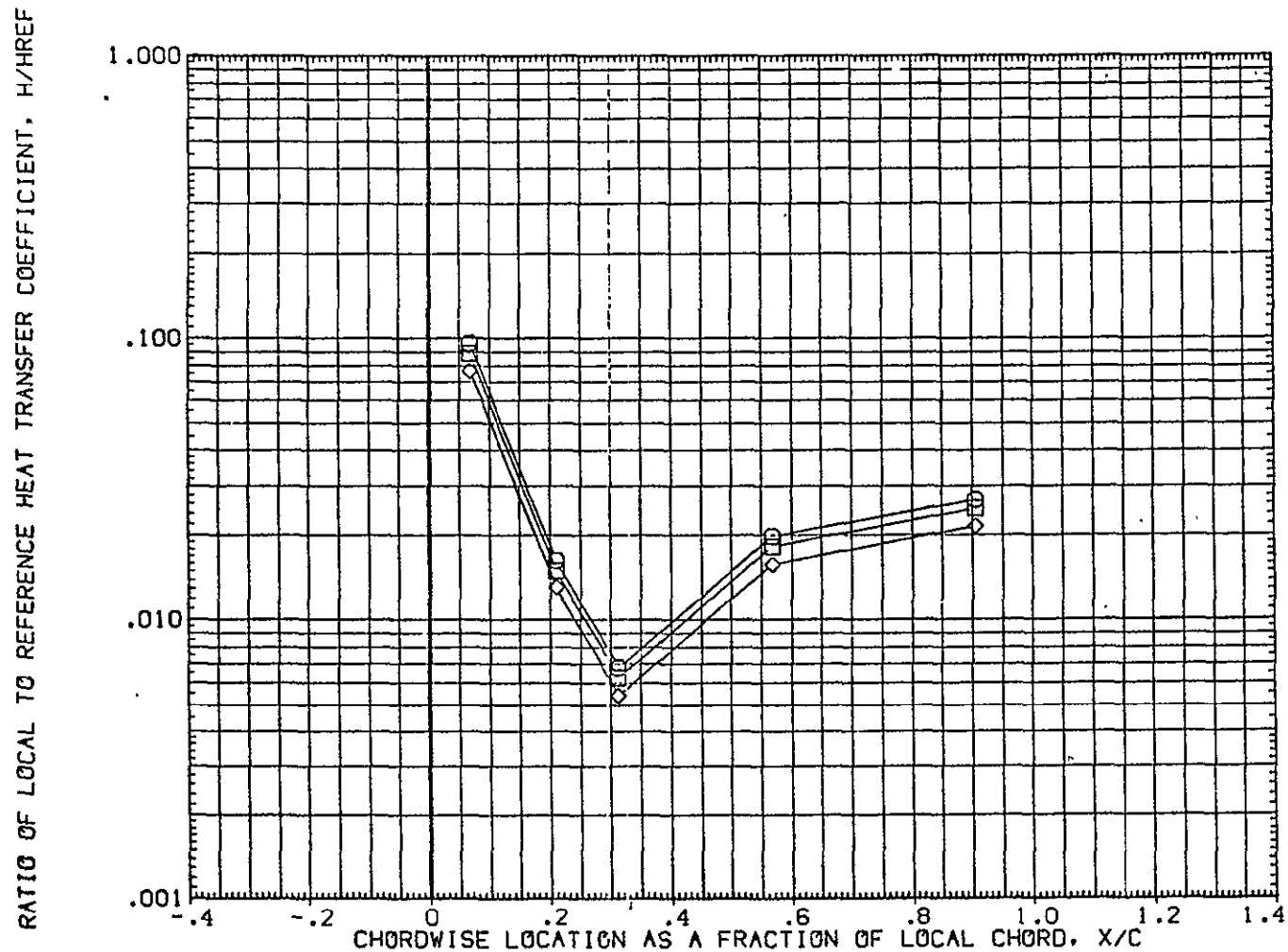


FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER $\alpha = 0$

OH12/IH21 (CAL HST 173-100) 37 0 T WING L.S.(RUGW05)

| SYMBOL | HAW/HT | 2Y/B | PACH | ALPHA | PARAMETRIC VALUES | BETA | |
|--------|--------|------|-------|-------|-------------------|------|--|
| ○ | .850 | .500 | 7.616 | | | | |
| □ | .900 | | | | | | |
| ◇ | 1.000 | | | | | | |

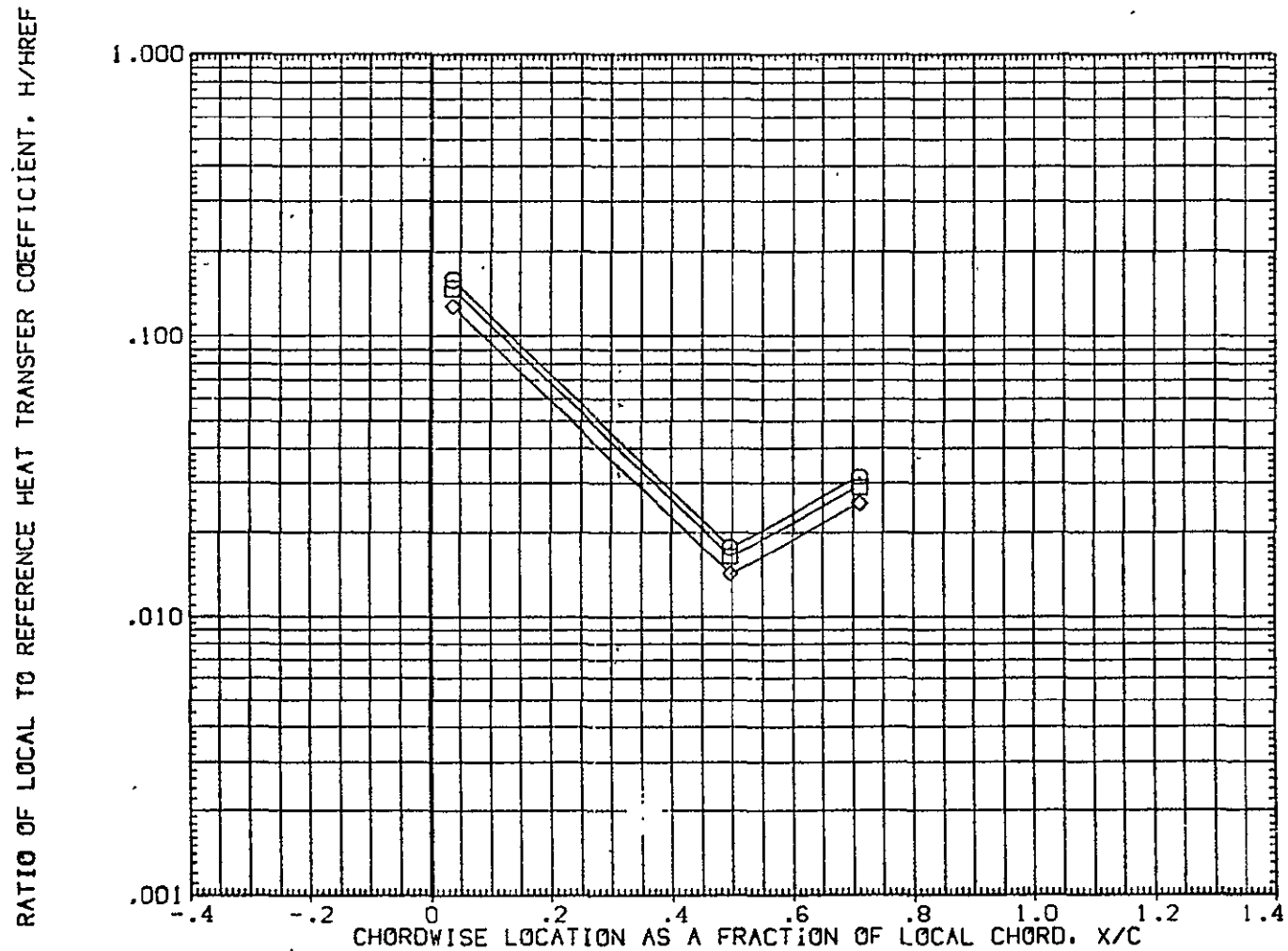


FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER ALPHA = 0

OH12/IH21 (CAL HST 173-100) 37 0 T WING L.S.(RUGW05)

| SYMBOL | HAW/HT | 2Y/B | MACH | PARAMETRIC VALUES | | |
|--------|--------|------|-------|-------------------|------|--|
| | | | | ALPHA | BETA | |
| □ | .850 | .600 | 7.616 | .000 | | |
| ◇ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

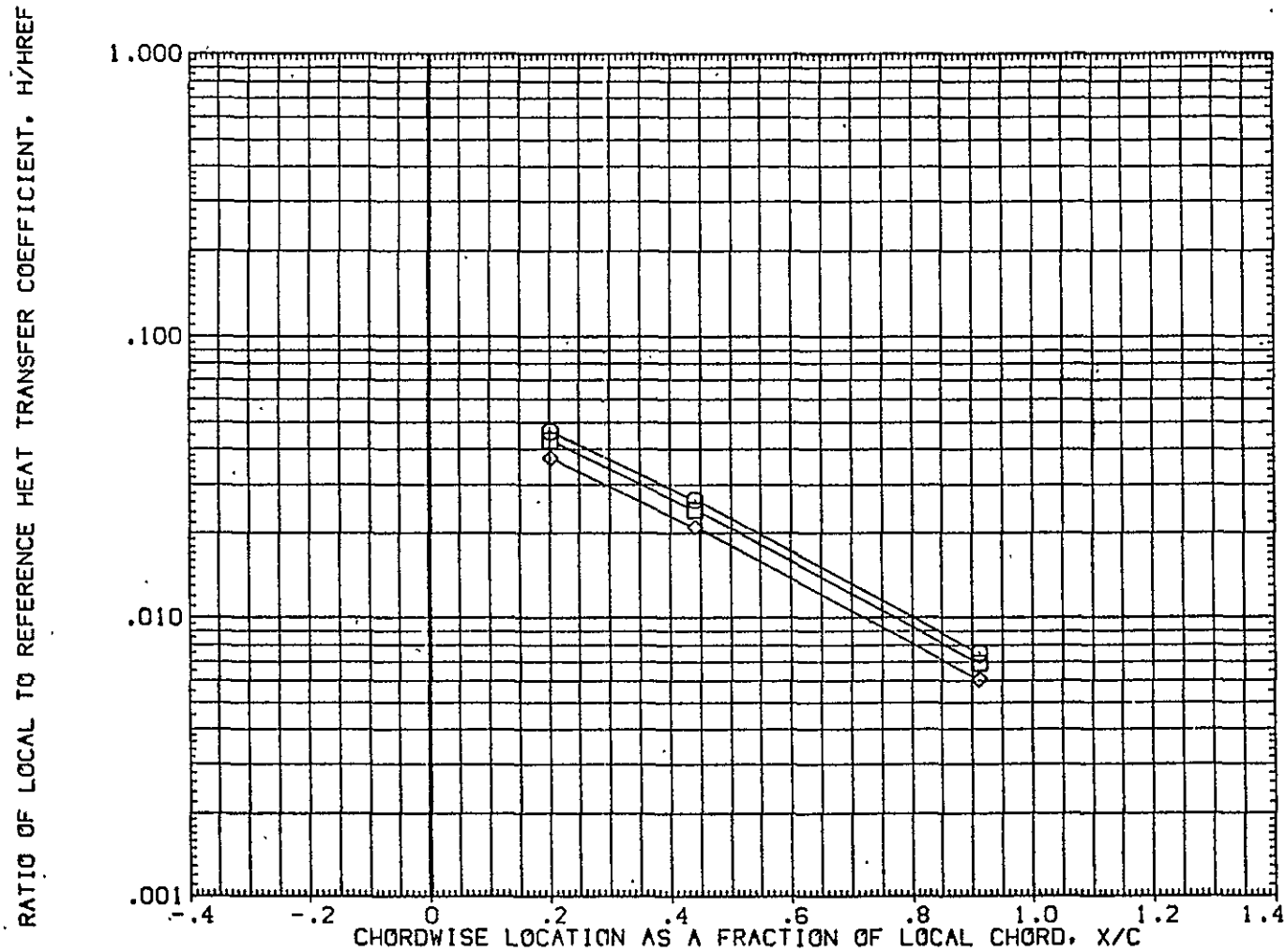


FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER $\alpha = 0$

OH12/IH21 (CAL HST 173-100) 37 0 T WING L.S.(RUGW05)

| SYMBOL | HAW/HT | 2Y/B | MACH | PARAMETRIC VALUES | | |
|--------|--------|------|-------|-------------------|------|------|
| ◇ | .850 | .750 | 7.616 | ALPHA | .000 | BETA |
| □ | .900 | | | | | .000 |
| ○ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, h/h_{REF}

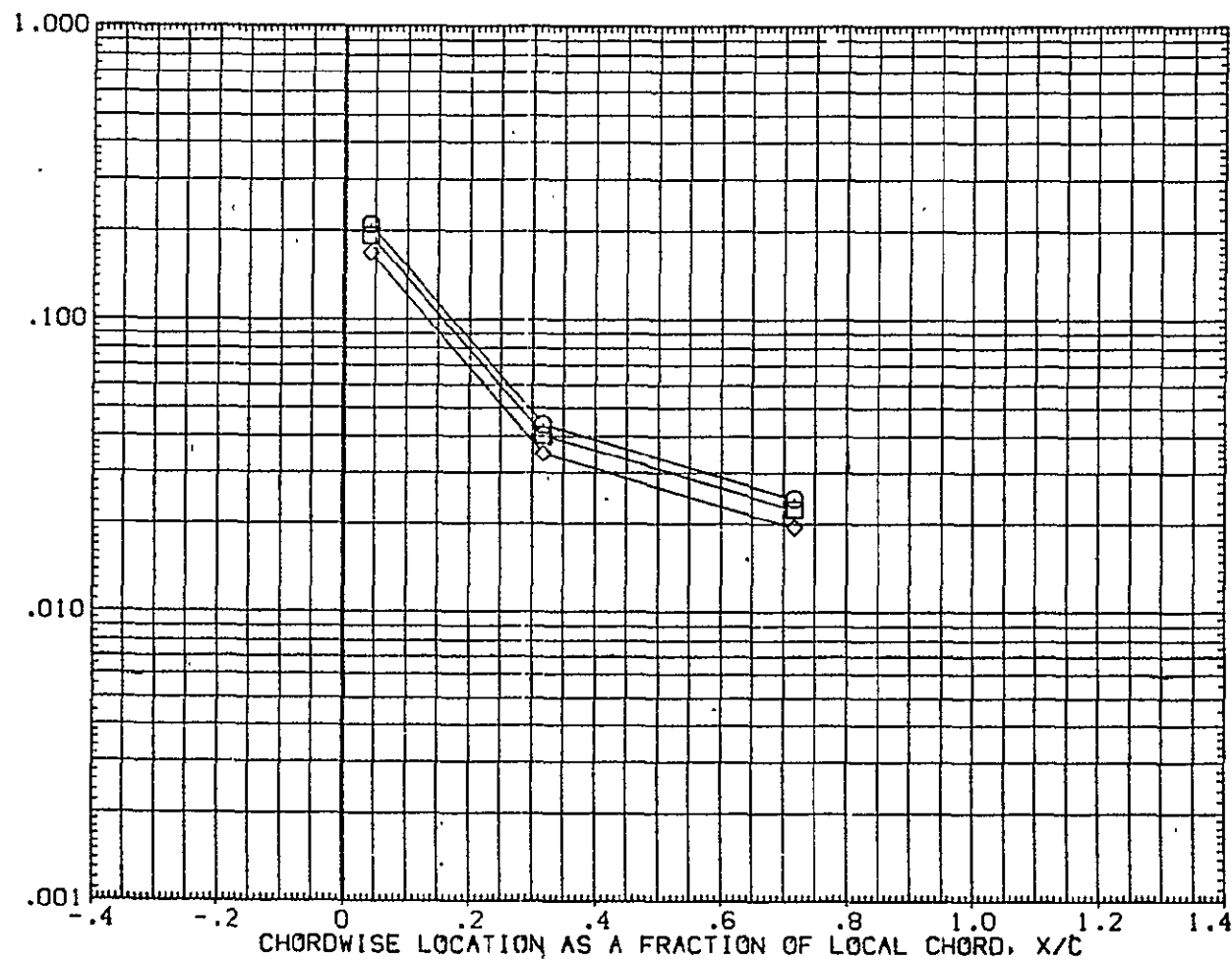


FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER ALPHA = 0

0H12/IH21 (CAL HST 173-100) 37 0 T WING L.S.(RUGW05)

| SYMBOL | HAW/HT | 2Y/B | MACH | PARAMETRIC VALUES | | |
|--------|--------|------|-------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| ◇ | .850 | .950 | 7.616 | .000 | | .000 |
| □ | .900 | | | | | |
| ○ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

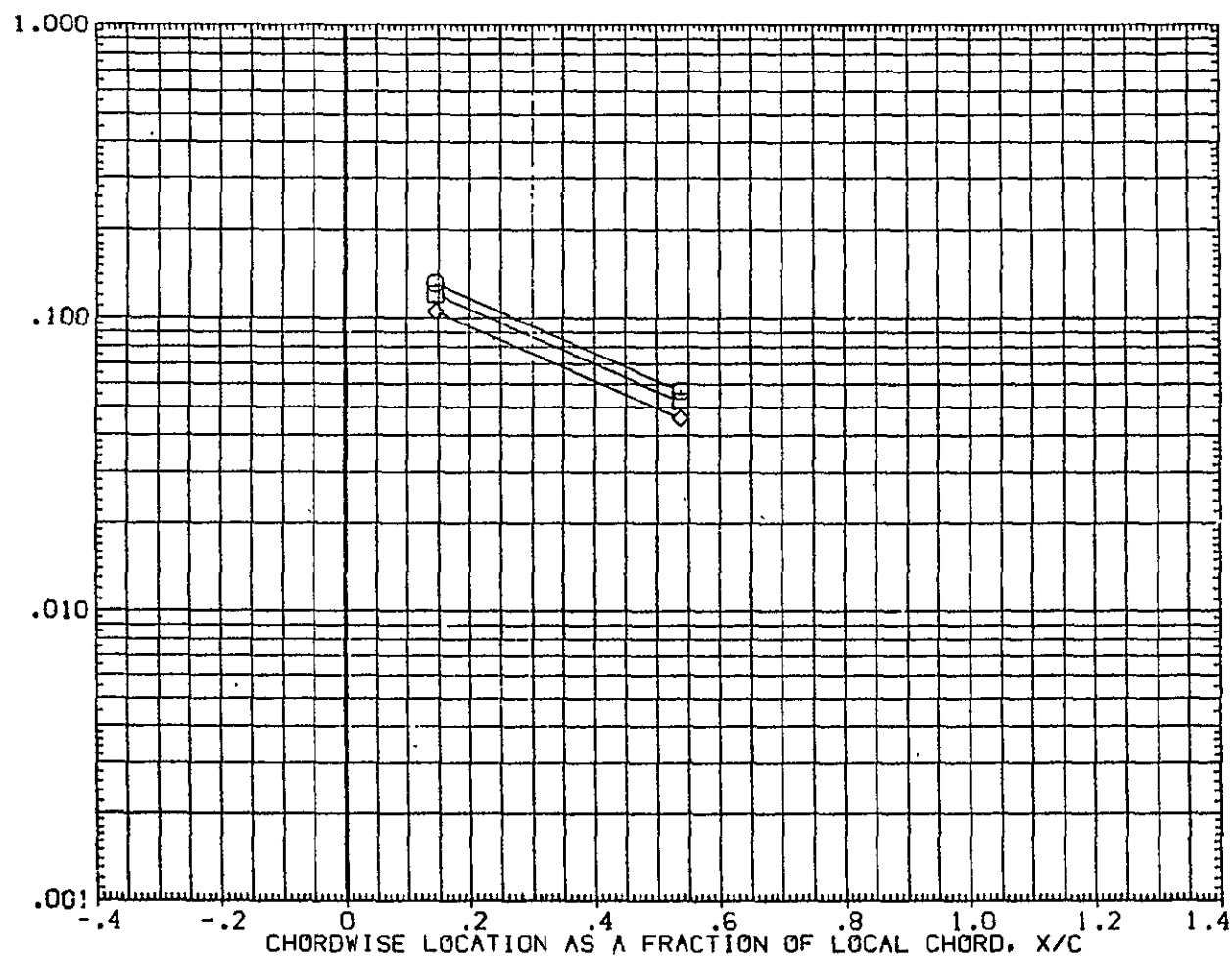


FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER ALPHA = 0

0H12/IH21 (CAL HST 173-100) 37 0 T WING L.S.(RUGW05)

| SYMBOL | HAW/HT | 2Y/B | MACH | PARAMETRIC VALUES | | |
|--------|--------|------|--------|-------------------|------|------|
| ◇ | .850 | .250 | 18.330 | ALPHA | .000 | BETA |
| □ | .900 | | | | | .000 |
| ○ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

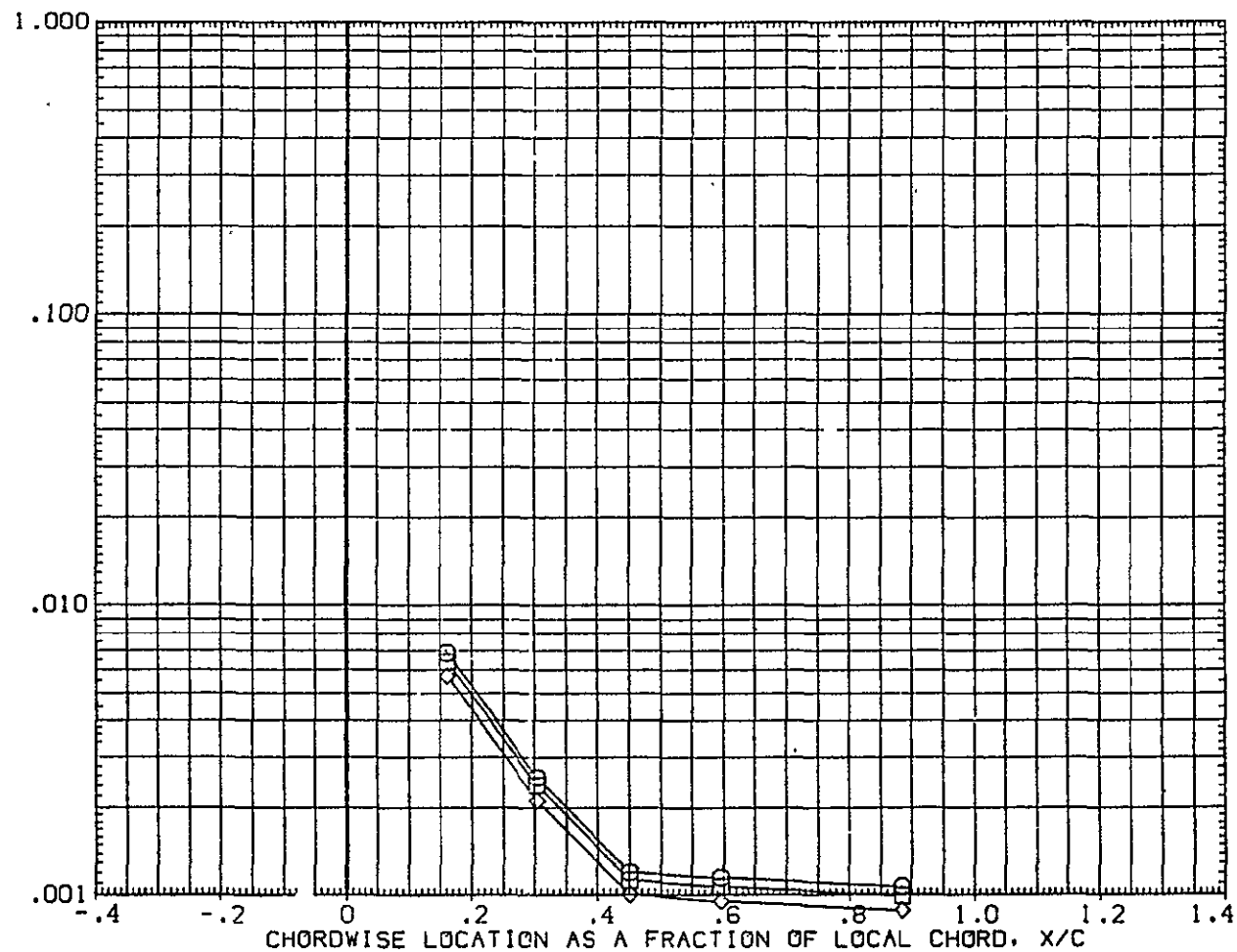


FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER ALPHA = 0

0H12/IH21 (CAL HST 173-100) 37 0 T WING L.S.(RUGW05)

| | | | | |
|--------|--------|------|--------|----------------------|
| SYMBOL | HAW/HT | 2Y/B | MACH | PARAMETRIC VALUES |
| ◇ □ ○ | .850 | .400 | 18.330 | ALPHA .000 BETA .000 |
| | .900 | | | |
| | 1.000 | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

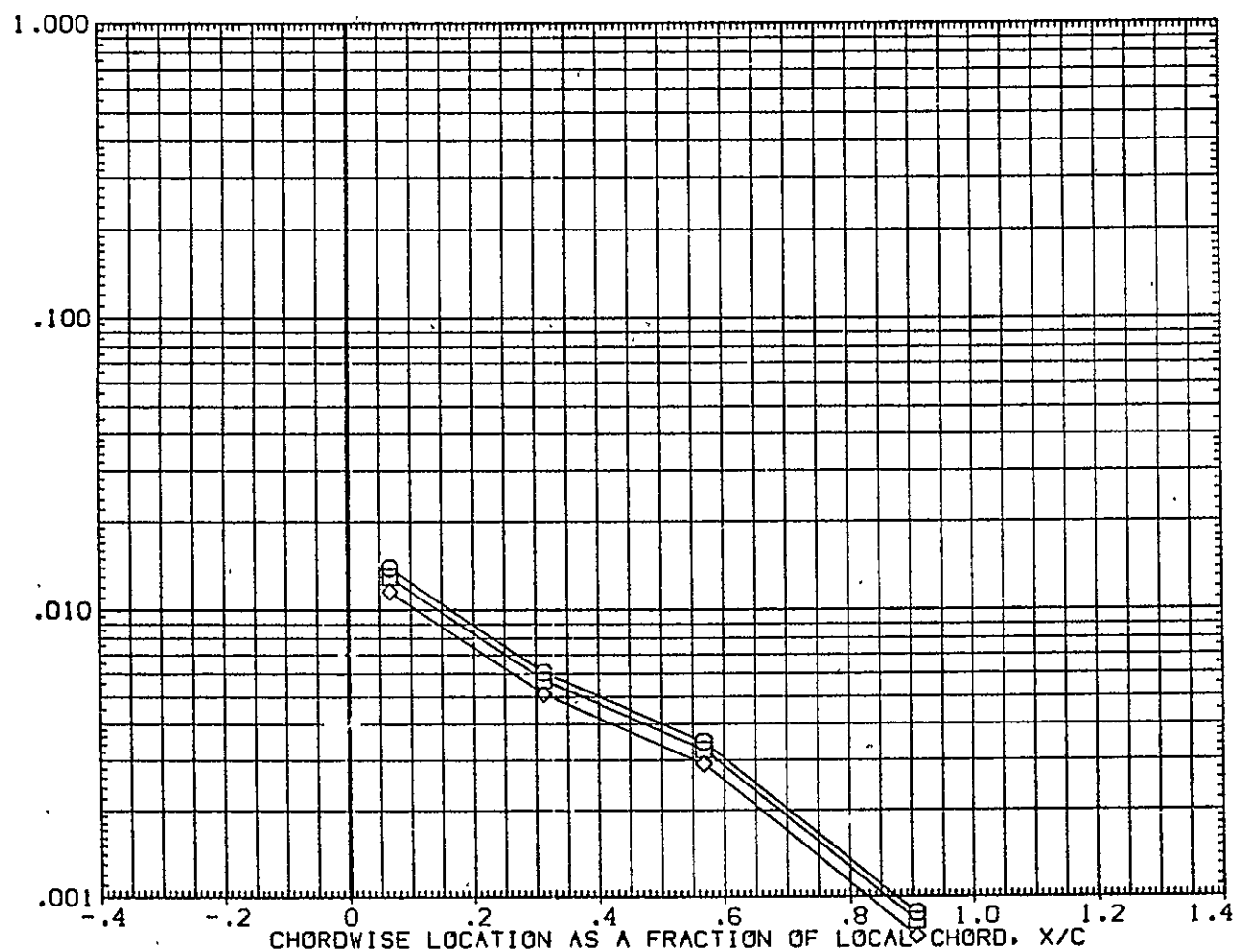


FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER ALPHA = 0

0H12/1H21 (CAL HST 173-100) 37 0 T WING L.S.(RUGW05)

| SYMBOL | HAW/HT | ZY/B | MACH | PARAMETRIC VALUES | | |
|--------|--------|------|--------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| ◇ | .850 | .500 | 18.330 | .000 | .000 | .000 |
| □ | .900 | | | | | |
| ○ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

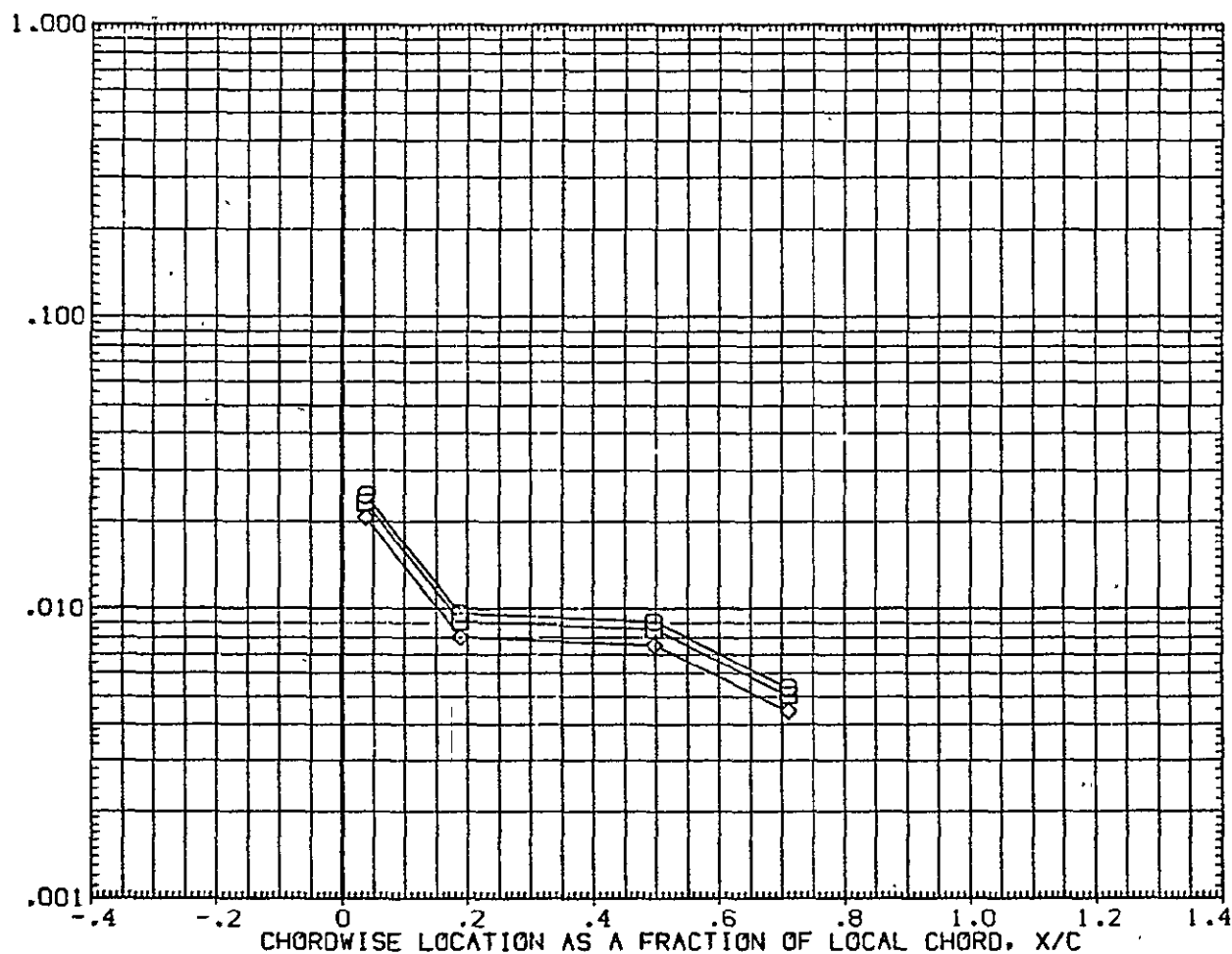


FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER $\alpha = 0$

0H12/1H21 (CAL HST 173-100) 37 0 T WING L.S.(RUGW05)

| | | | | | | |
|--------|--------|------|--------|-------------------|------|-----------|
| SYMBOL | HAW/HT | 2Y/B | MACH | PARAMETRIC VALUES | | |
| ◇ □ ○ | .850 | .600 | 18.330 | ALPHA | .000 | BETA .000 |
| | .900 | | | | | |
| | 1.000 | | | | | |

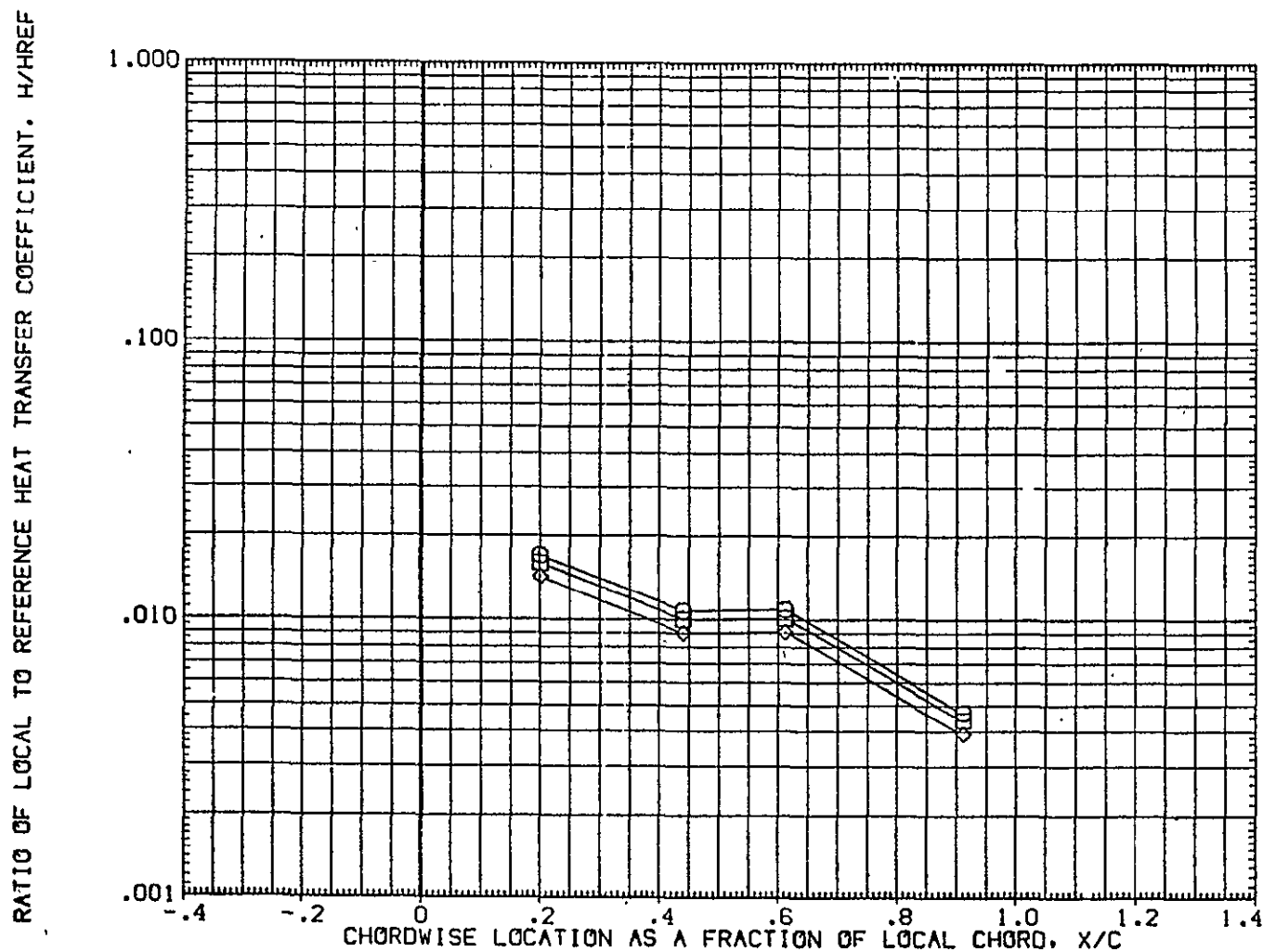


FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER $\alpha = 0$

0H12/1H21 (CAL HST 173-100) 37 0 T WING L.S.(RUGW05)

| | | | | | | |
|--------|--------|------|--------|-------------------|------|------|
| SYMBOL | HAW/HT | 2Y/B | MACH | PARAMETRIC VALUES | | |
| ○ | .850 | .750 | 18.330 | ALPHA | .000 | BETA |
| □ | .900 | | | | | .000 |
| ◇ | 1.000 | | | | | |

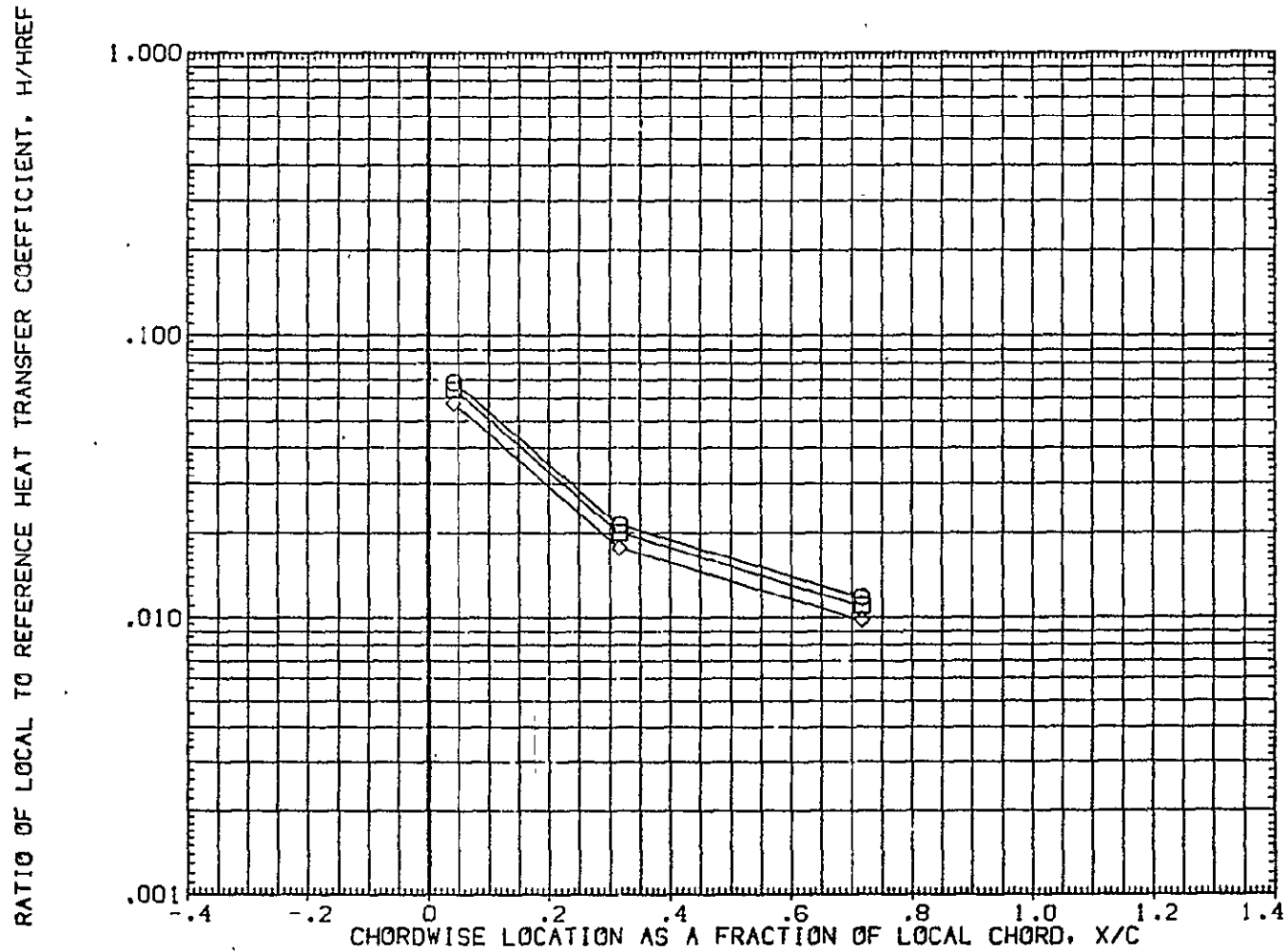


FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER $\alpha = 0$

OH12/IH21 (CAL HST 173-100) 37 ° T WING L.S.(RUGW05)

| SYMBOL | HAY/HT | 2Y/B | MACH | ALPHA | PARAMETRIC VALUES | |
|--------|--------|------|--------|-------|-------------------|------|
| ○ | .850 | .950 | 18.330 | | .000 | BETA |
| □ | .900 | | | | | .000 |
| ◇ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

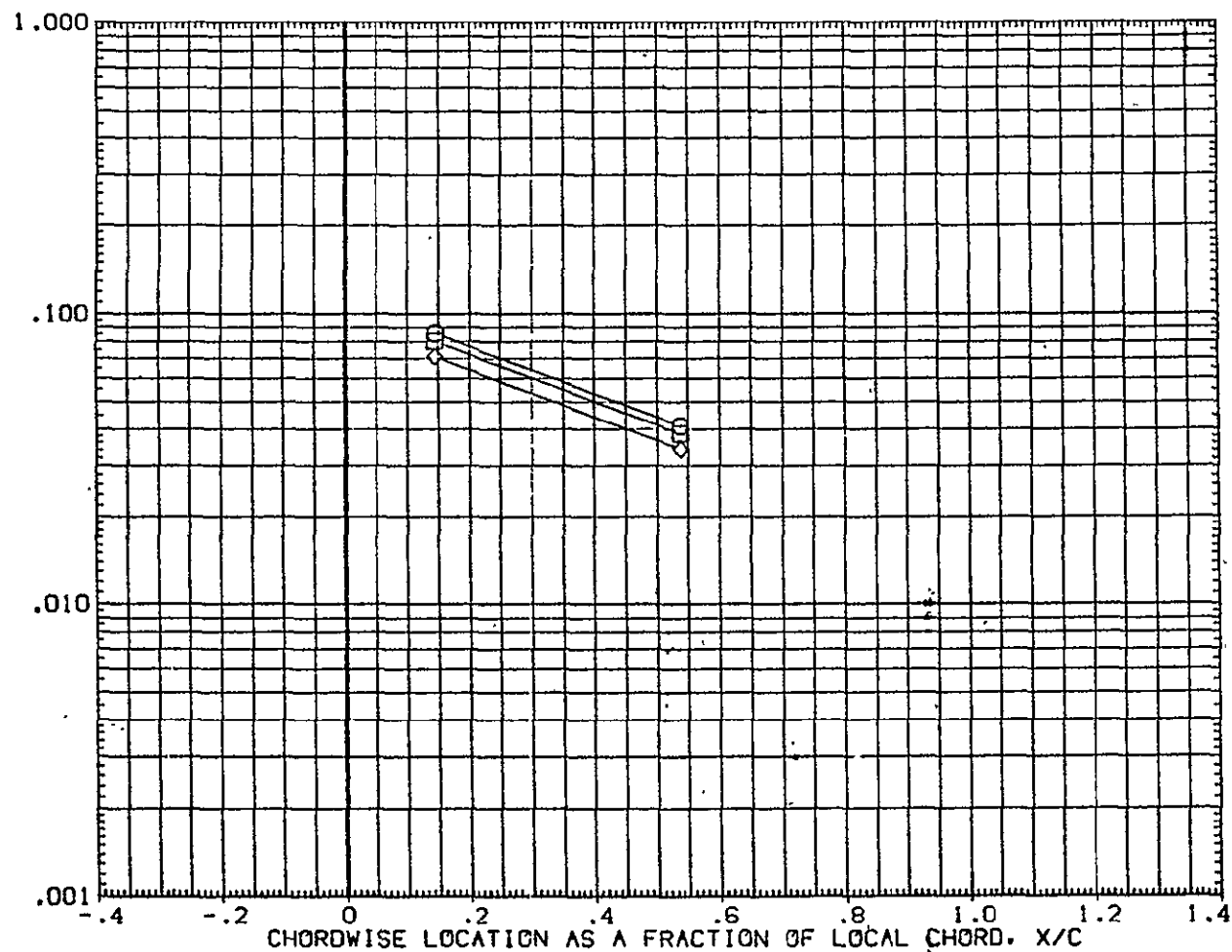


FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER ALPHA = 0

OH12/IH21 (CAL HST 173-100) 37 0 T WING L.S.(RUGW05)

| SYMBOL | HAW/HT | 2Y/B | MACH | ALPHA | PARAMETRIC VALUES | BETA | .000 |
|--------|--------|------|--------|-------|-------------------|------|------|
| ○ | .850 | .250 | 19.200 | | | | |
| □ | .900 | | | | | | |
| ◇ | 1.000 | | | | | | |

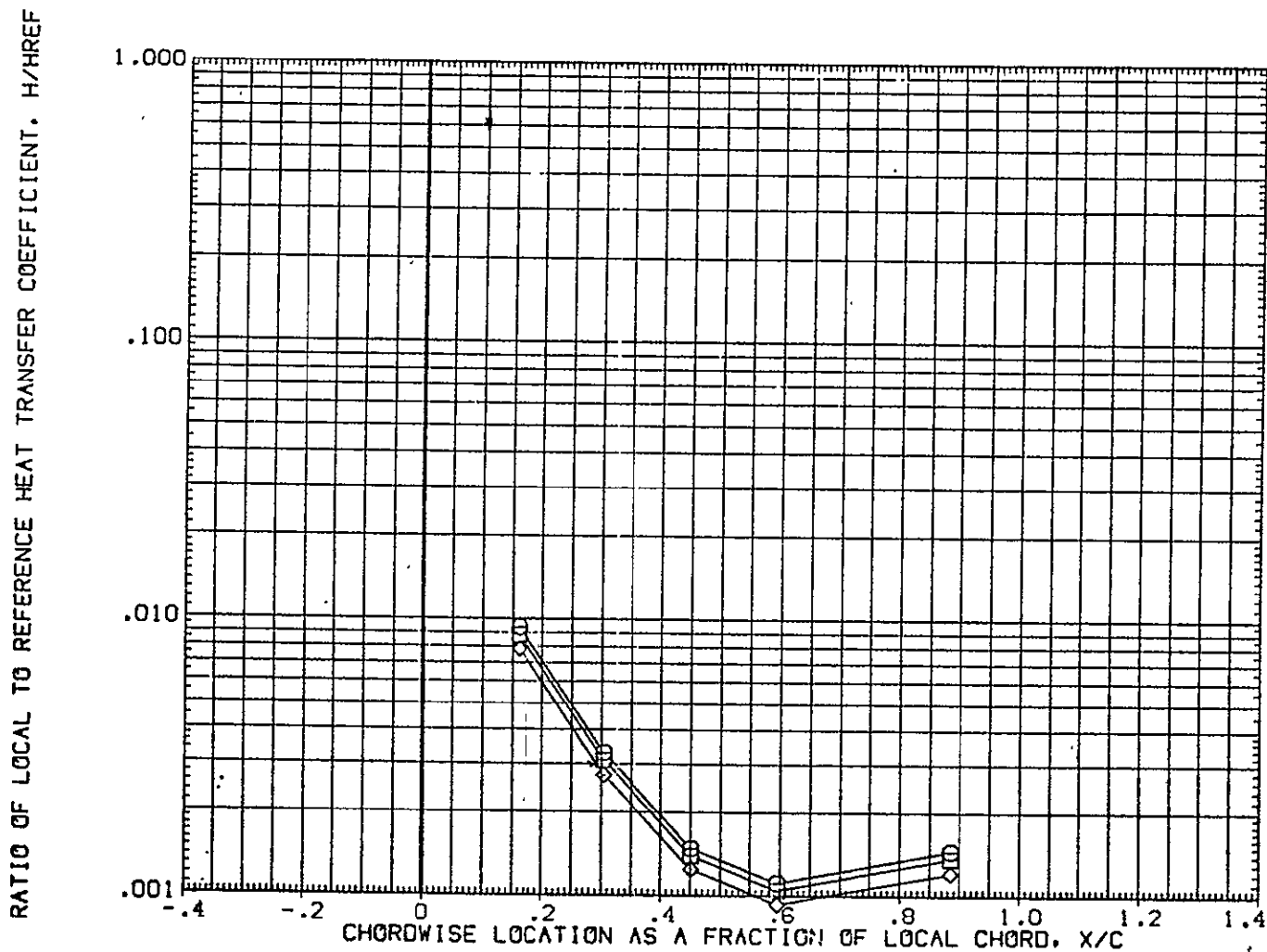


FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER ALPHA = 0

REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR.

0H12/1H21 (CAL HST 173-100) 37 0 T WING L.S.(RUGW05)

| | | | | | | |
|--------|--------|------|--------|-------------------|------|------|
| SYMBOL | HAW/HT | 2Y/B | MACH | PARAMETRIC VALUES | | |
| ○ | .850 | .400 | 19.200 | ALPHA | .000 | BETA |
| □ | .900 | | | | | .000 |
| ◇ | 1.000 | | | | | |

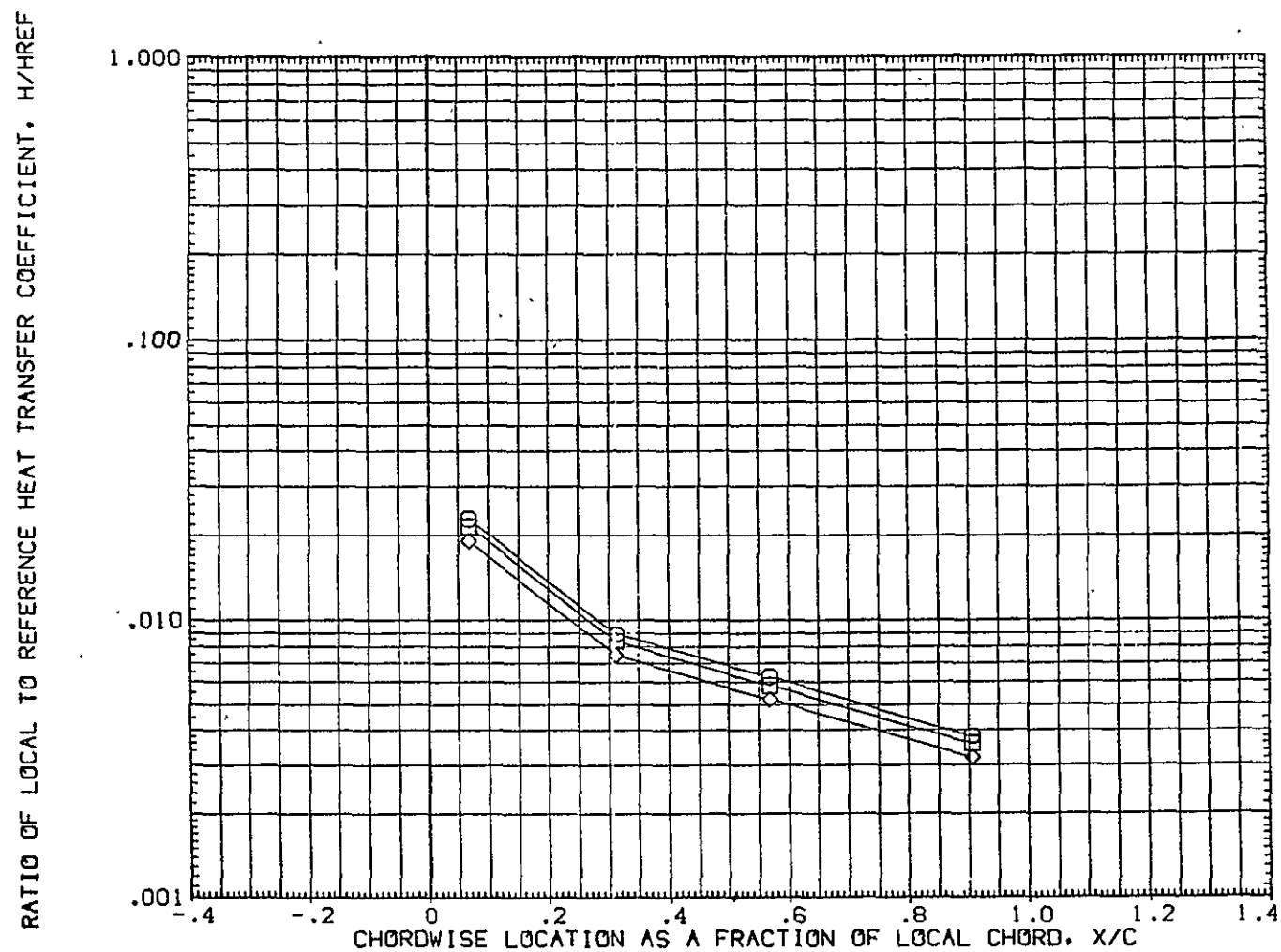


FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER $\alpha = 0$

0H12/IH21 (CAL HST 173-100) 37 0 T WING L.S.(RUGW05)

| SYMBOL | HAW/HT | 2Y/B | MACH | PARAMETRIC VALUES | | |
|--------|--------|------|--------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| ○ | .850 | .500 | 19.200 | .000 | .000 | .000 |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

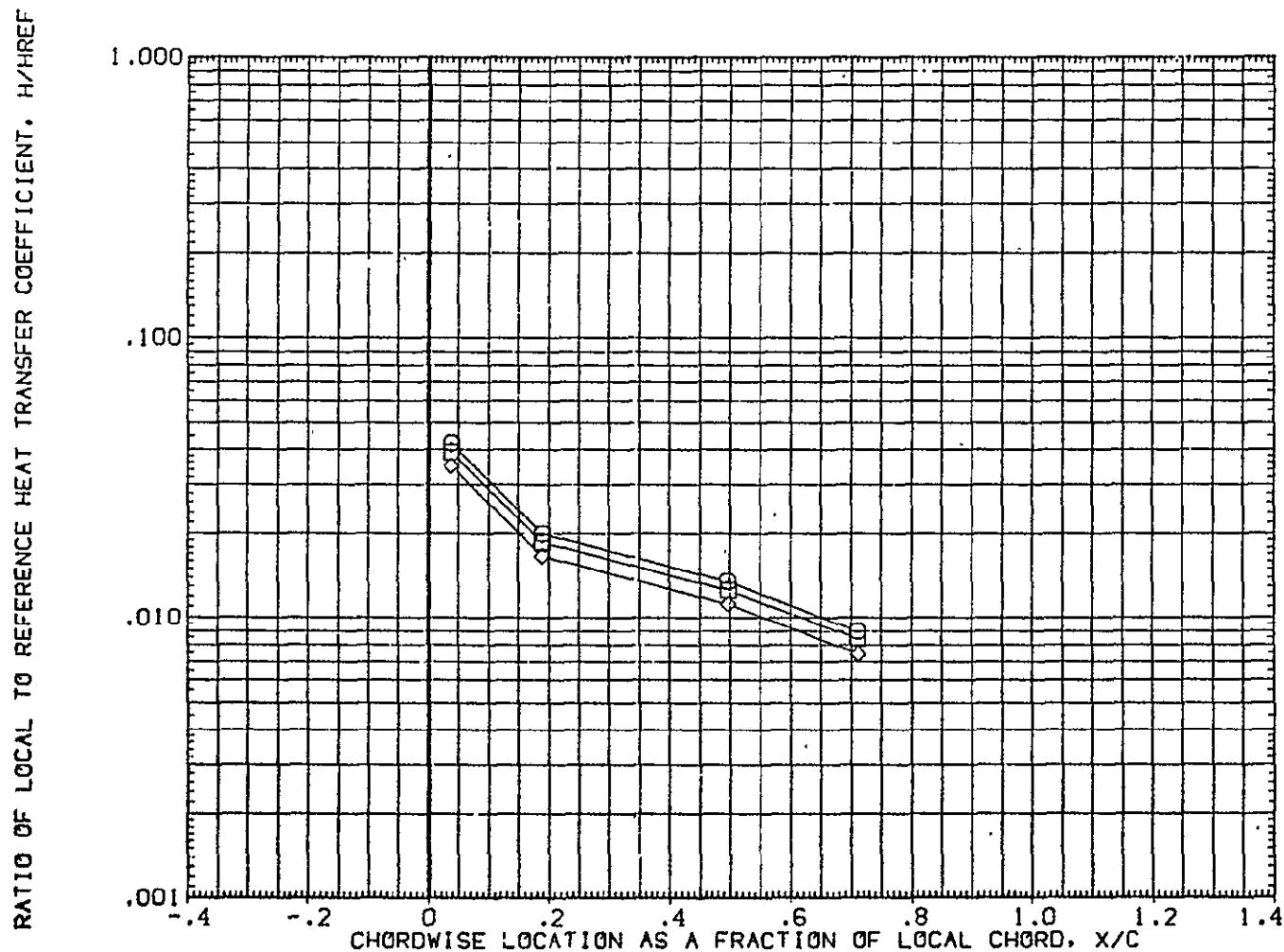


FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER $\alpha = 0$

0H12/1H21 (CAL HST 173-100) 37 0 T WING L.S.(RUGW05)

| SYMBOL | HAW/HT | 2Y/B | MACH | PARAMETRIC VALUES | | |
|--------|--------|------|--------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| □ | .857 | .600 | 19.200 | .000 | | .000 |
| ◇ | .900 | | | | | |
| | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

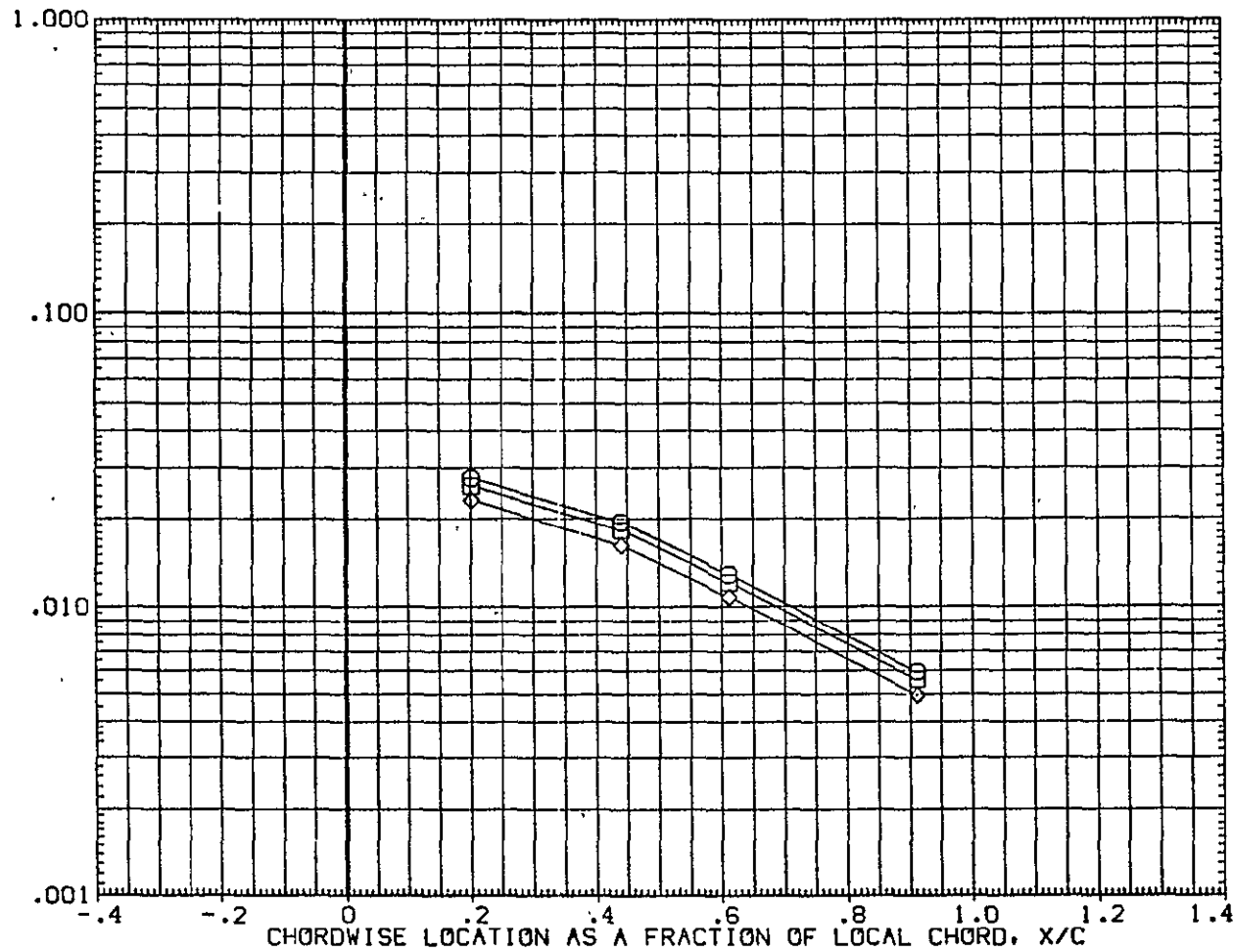


FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER ALPHA = 0

OH12/IH21 (CAL HST 173-100) 37 0 T WING L.S.(RUGW05)

| SYMBOL | HAW/HT | 2Y/B | MACH | PARAMETRIC VALUES | | |
|--------|--------|------|--------|-------------------|------|--|
| | | | | ALPHA | BETA | |
| ○ | .950 | .750 | 19.200 | .000 | | |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

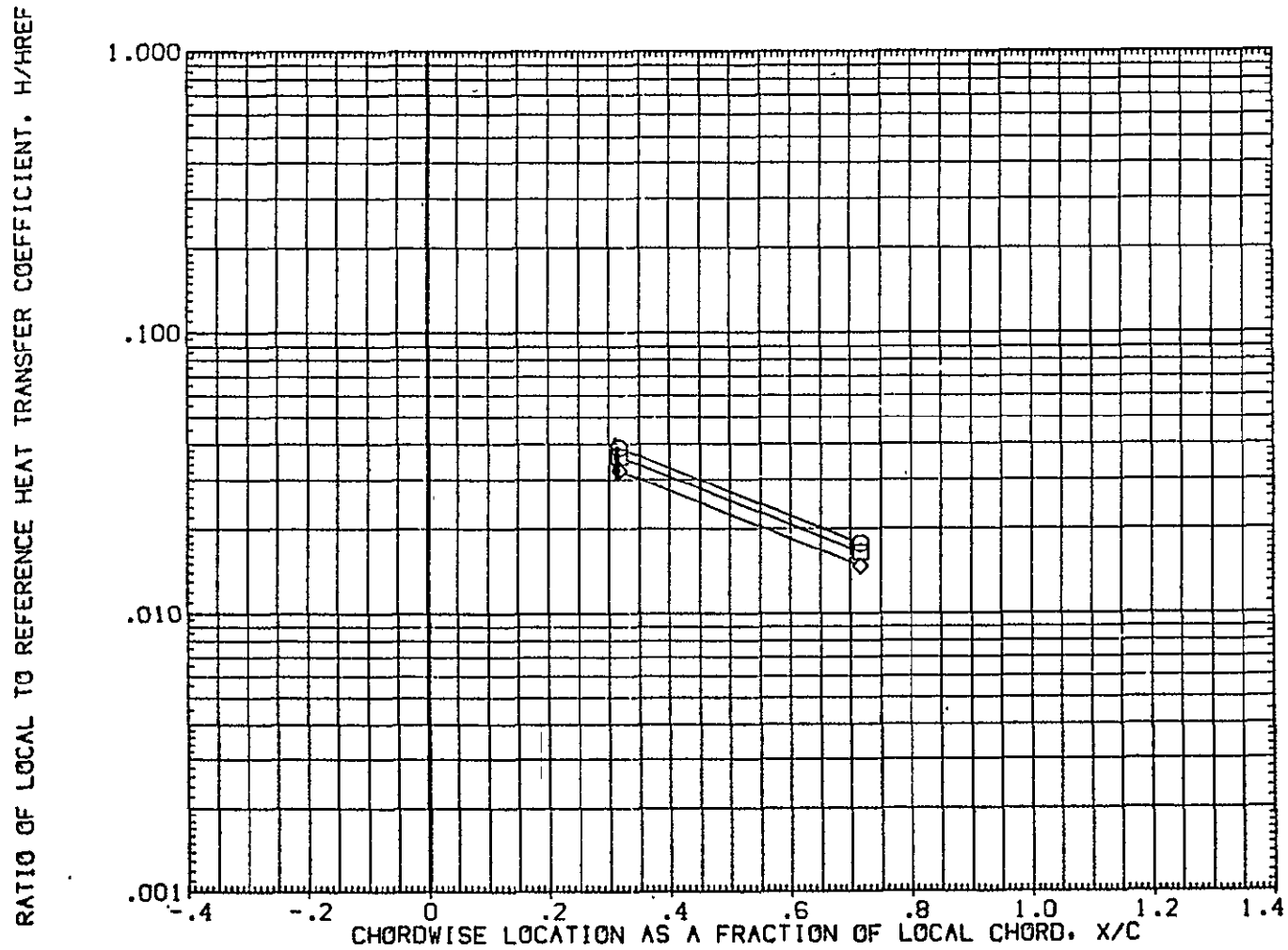


FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER $\alpha = 0$

0H12/IH21 (CAL HST 173-100) 37 0 T WING L.S.(RUGW05)

| SYMBOL | HAW/HT | ZY/B | MACH | PARAMETRIC VALUES | | |
|--------|--------|------|--------|-------------------|------|--|
| | | | | ALPHA | BETA | |
| □ | .850 | .950 | 19.200 | .000 | | |
| ◇ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

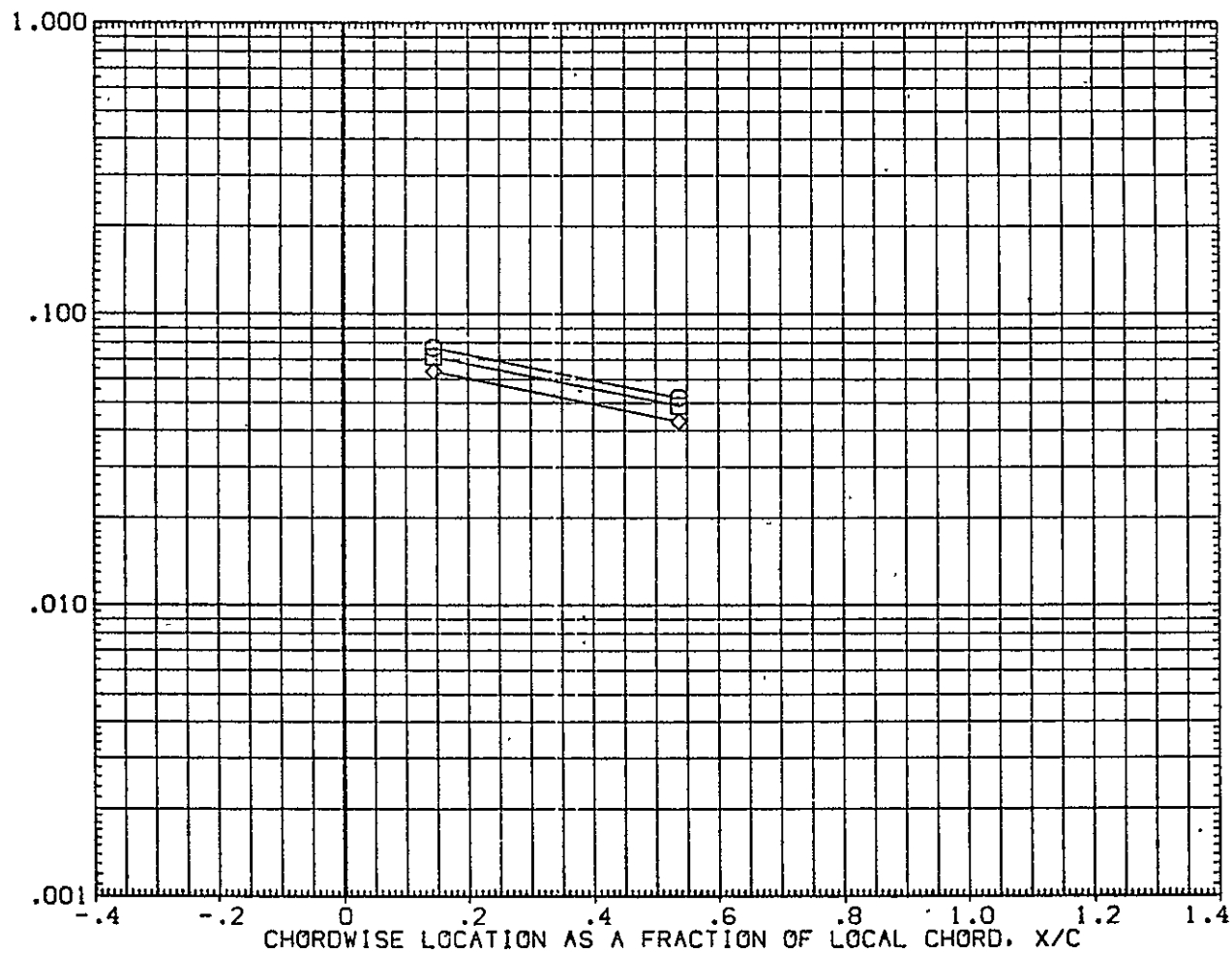


FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER ALPHA = 0

OH12 + IH21 MODEL 37 OT(05)/O(07) WING L.S. (IUGW05)

| | | | | | | |
|--------|--------|------|-------|-------------------|------|-----------|
| SYMBOL | HAW/HT | 2Y/B | MACH | PARAMETRIC VALUES | | |
| O | .900 | .250 | 7.000 | ALPHA | .000 | BETA .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, H_i/H_u

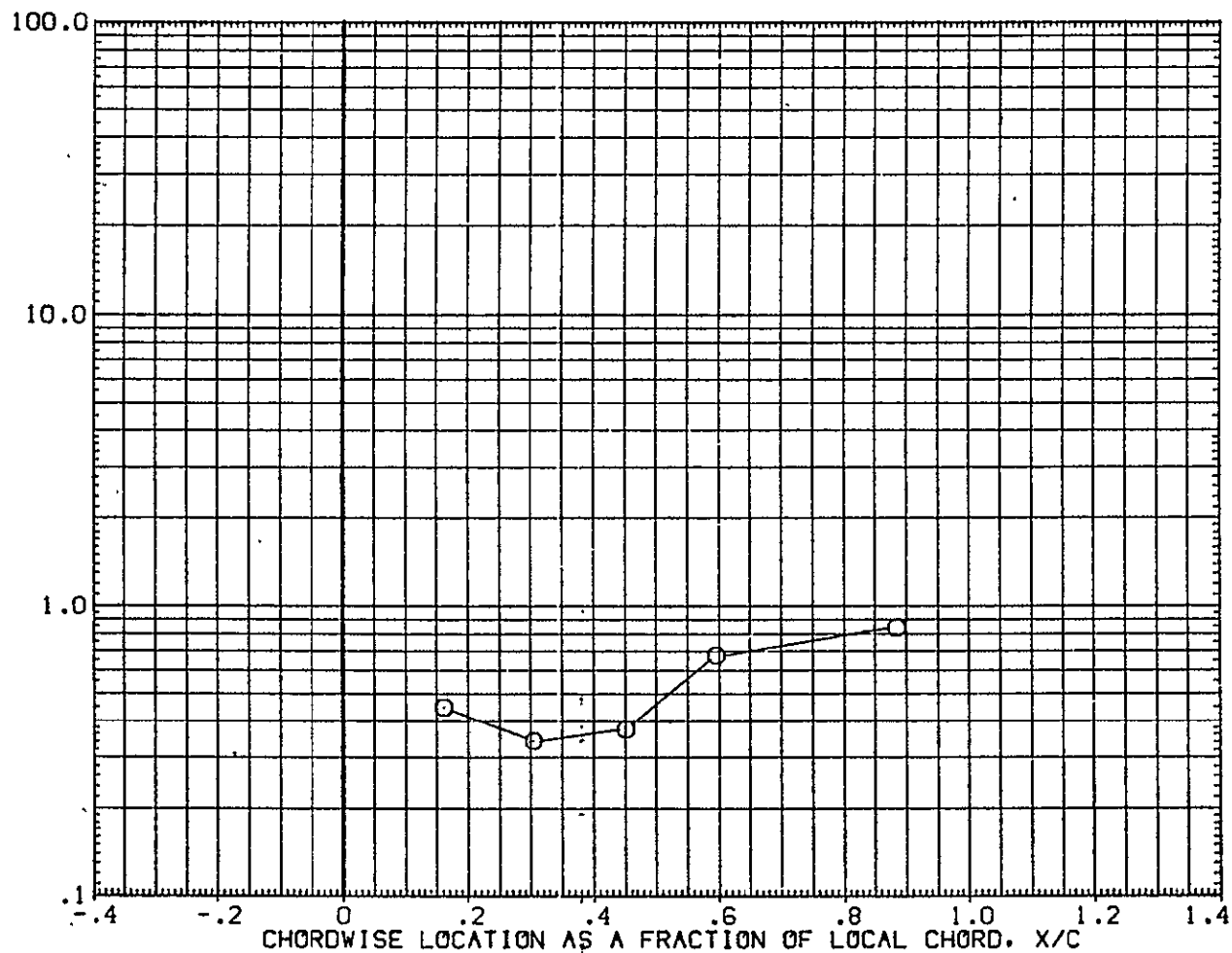


FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER ALPHA = 0

0H12 + 1H21 MODEL 37 0T(05)/0(07) WING L.S. (1UGW05)

SYMBOL
O
HAW/HT
.900
2Y/B
.400
MACH
7.000

PARAMETRIC VALUES
ALPHA
.000
BETA
.000

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, H_i/H_u

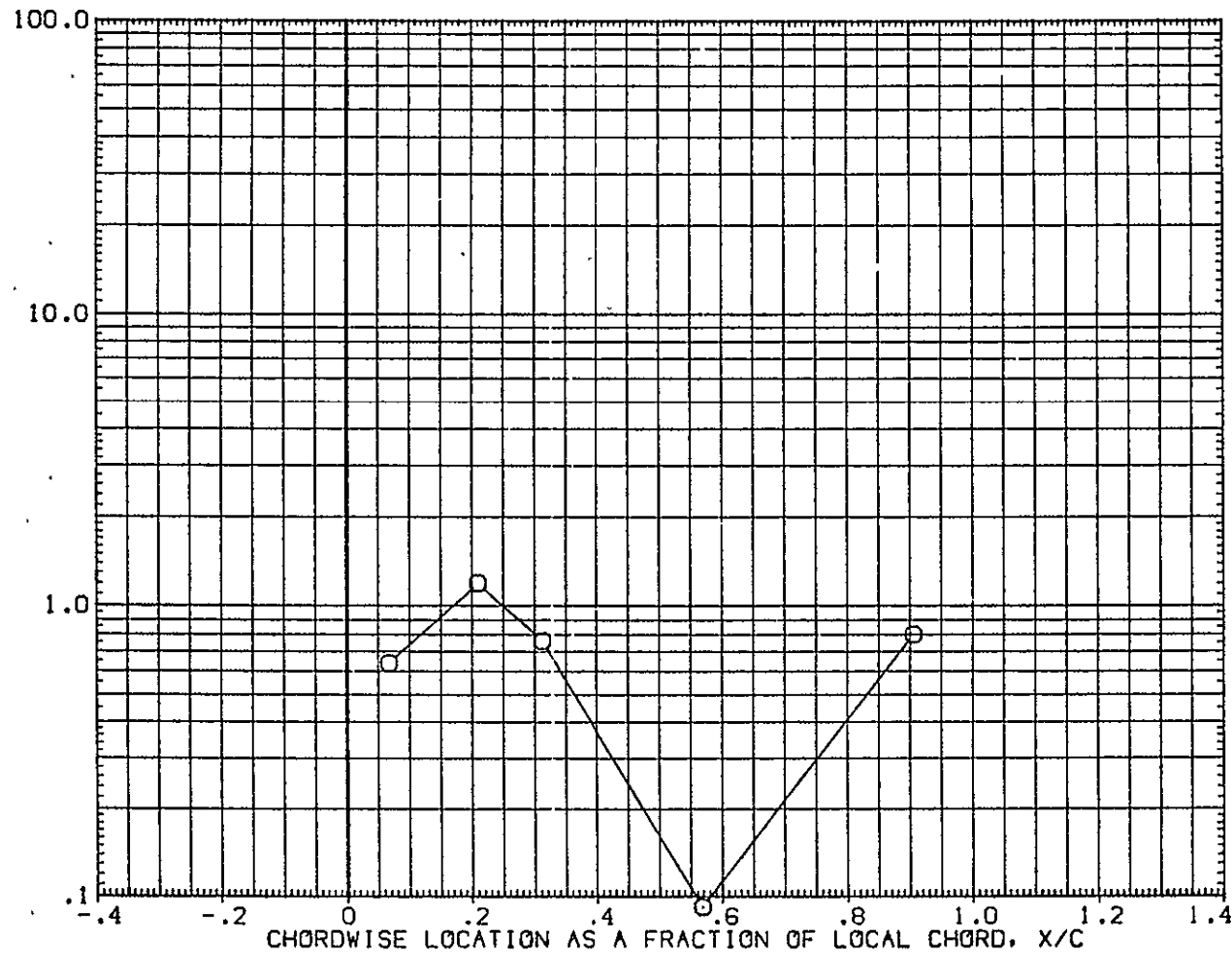


FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER ALPHA = 0

OH12 + IH21 MODEL 37 OT(05)/O(07) WING L.S. (UGW05)

| | | | | | | | |
|--------|--------|------|-------|-------|-------------------|------|--|
| SYMBOL | HAW/HT | 2Y/B | MACH | ALPHA | PARAMETRIC VALUES | BETA | |
| O | .900 | .500 | 7.000 | | .000 | .000 | |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, H_i/H_u

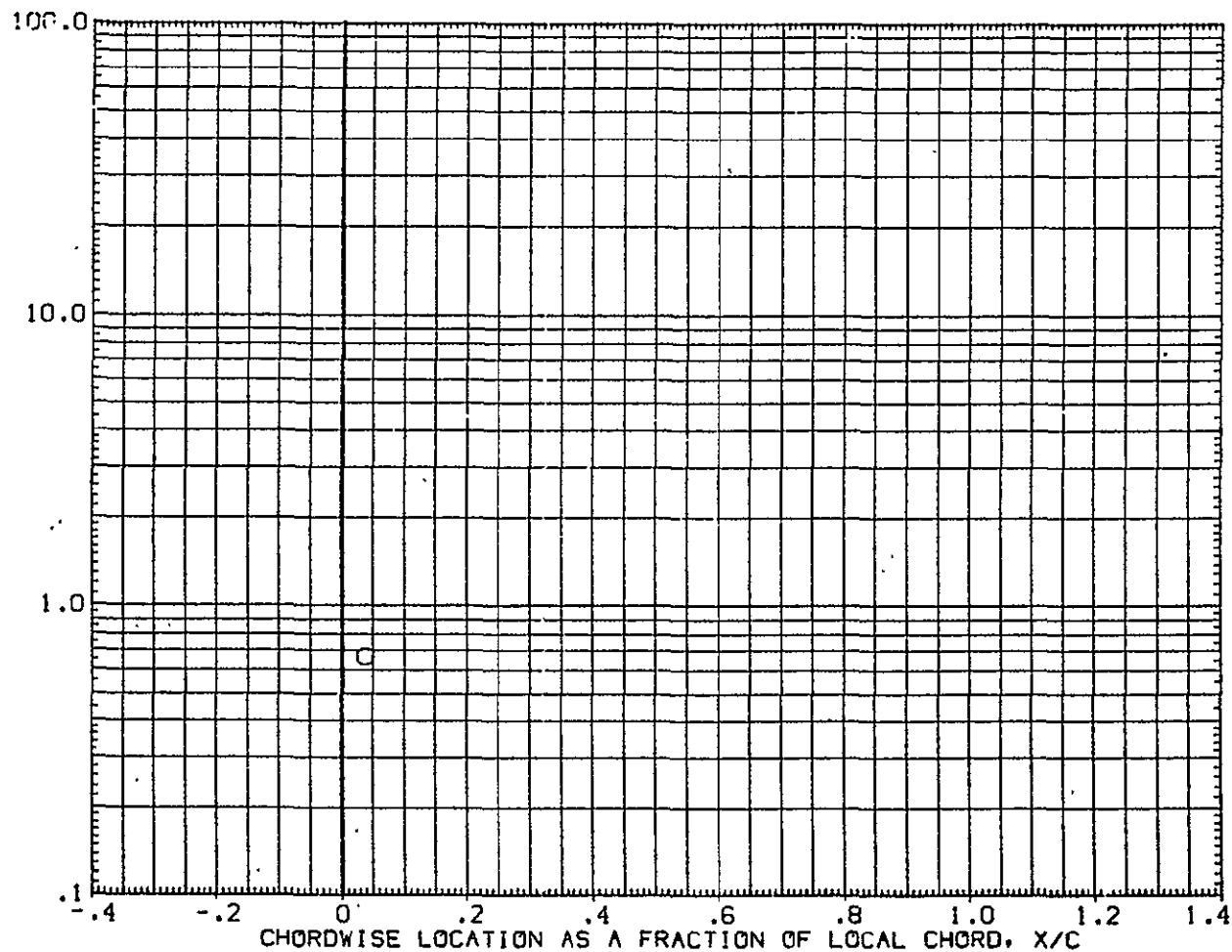


FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER ALPHA = 0

OH12 + IH21 MODEL 37 0T(05)/0(07) WING L.S. (IUGW05)

| | | | | |
|--------|--------|------|-------|----------------------|
| SYMBOL | HAW/HT | 2Y/B | MACH | PARAMETRIC VALUES |
| ○ | .900 | .600 | 7.000 | ALPHA .000 BETA .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, H_i/H_u

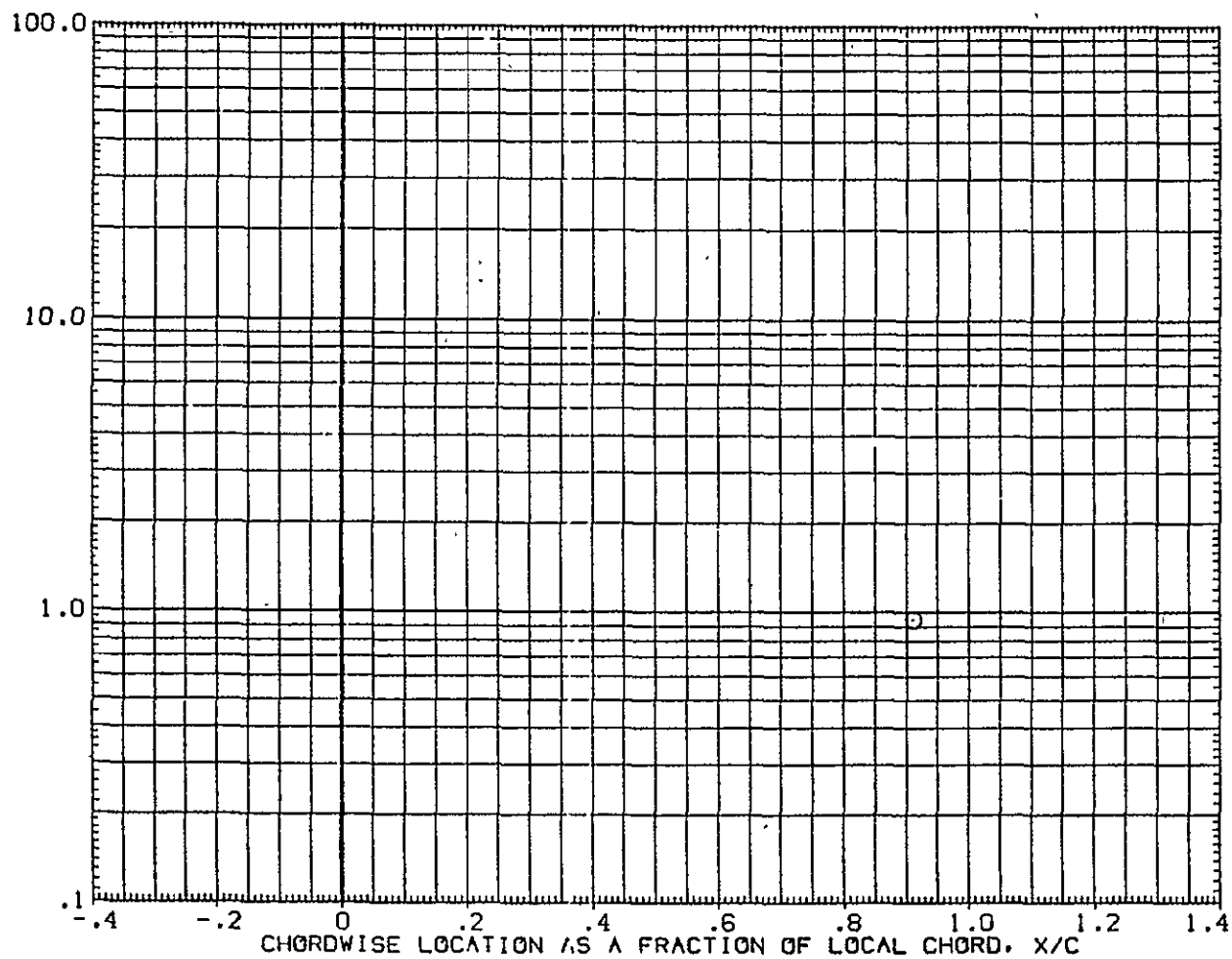


FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER ALPHA = 0

OH12 + IH21 MODEL 37 OT(05)/O(07) WING L.S. (IUGW05)

| | | | | | | | |
|--------|--------|------|-------|-------|-------------------|------|------|
| SYMBOL | HAW/HT | 2Y/B | MACH | ALPHA | PARAMETRIC VALUES | BETA | |
| O | .900 | .750 | 7.000 | | .000 | .000 | .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, H_i/H_u

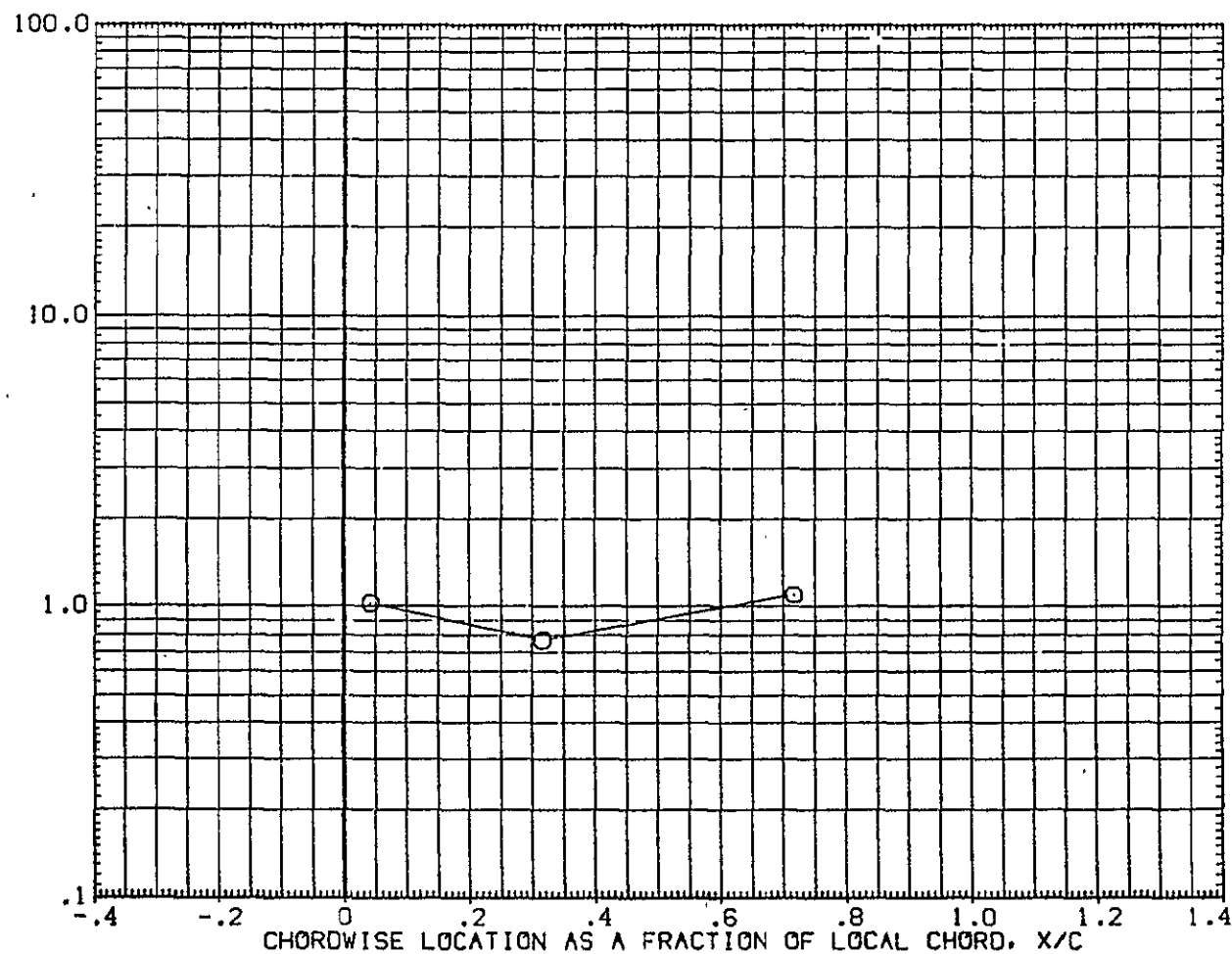


FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER $\alpha = 0$

OH12 + IH21 MODEL 37 OT(05)/O(07) WING L.S. (UGW05)

SYMBOL
O

HAW/HT
.900

2Y/B
.950

MACH
7.000

PARAMETRIC VALUES
ALPHA .000 BETA .000

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, H_i/H_u

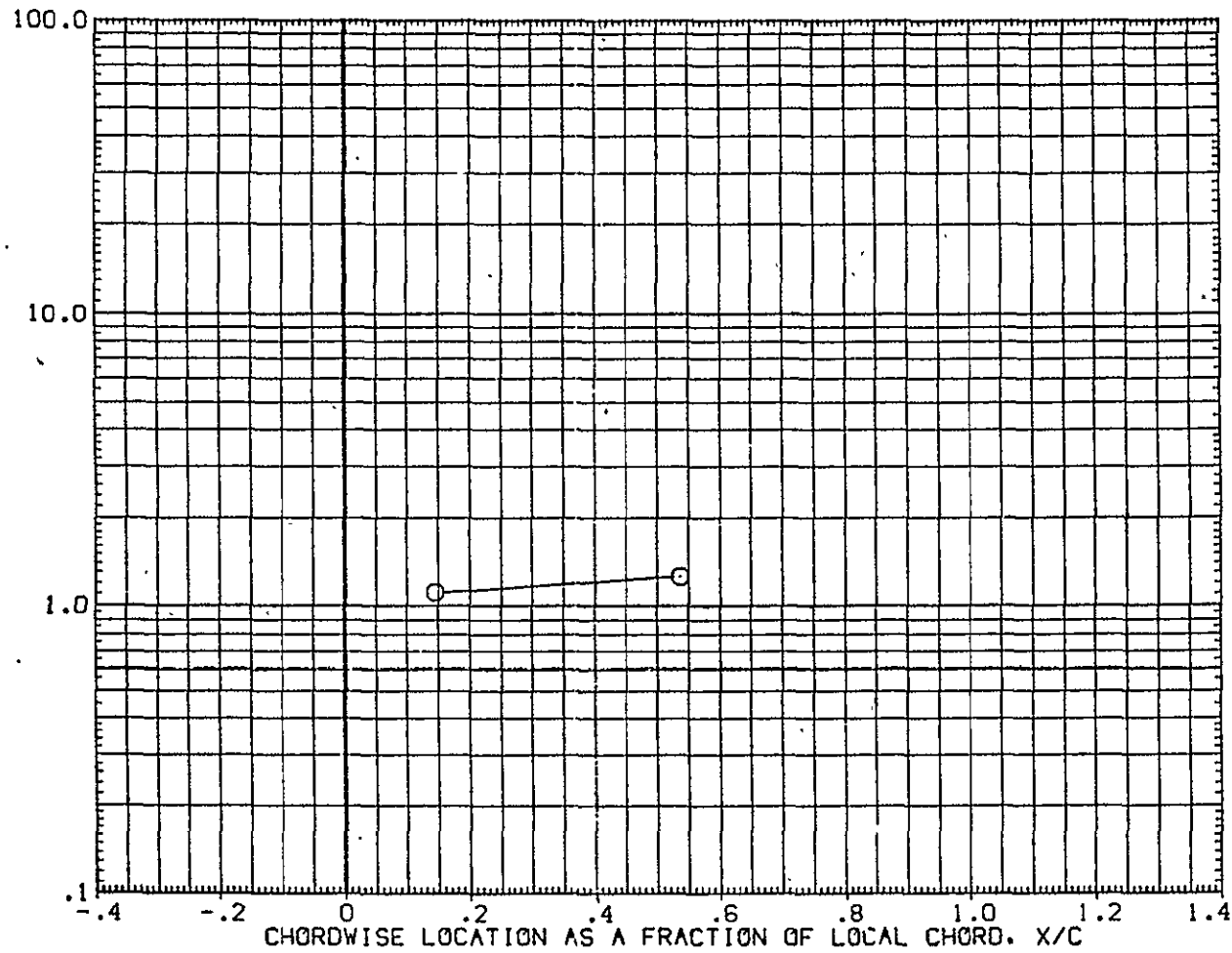


FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER ALPHA = 0

0H12 + 1H21 MODEL 37 0T(05)/0(07) WING L.S. (1UGW05)

| | | | | | | |
|--------|--------|------|-------|-------------------|------|-----------|
| SYMBOL | HAW/HT | 2Y/B | MACH | PARAMETRIC VALUES | | |
| ○ | .900 | .250 | 7.610 | ALPHA | .000 | BETA .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU

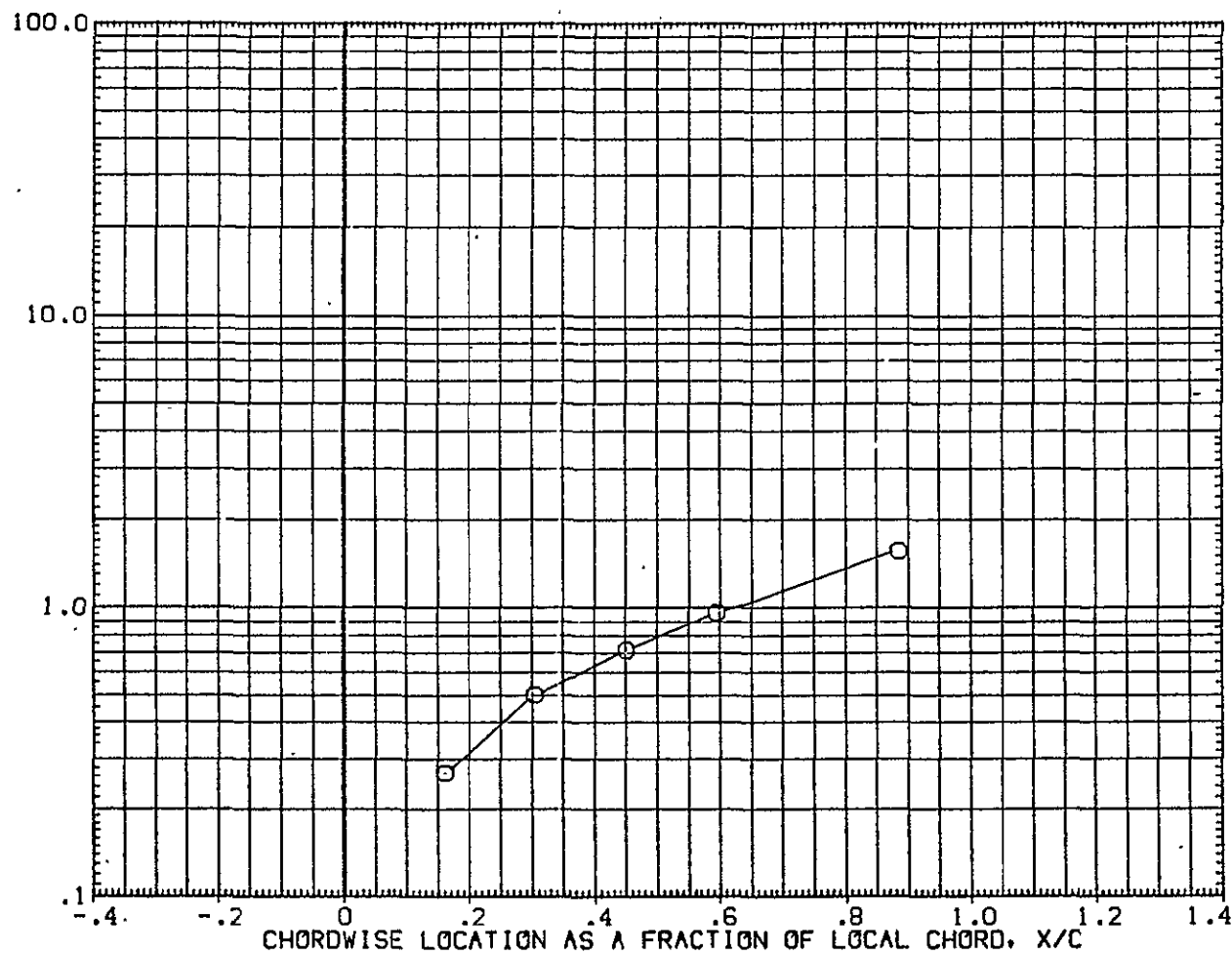


FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER ALPHA = 0
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REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR

0H12 + IH21 MODEL 37 0T(05)/0(07) WING L.S. (IUGW05)

SYMBOL
O

HAW/HT
.900

ZY/B
.400

MACH
7.610

PARAMETRIC VALUES

ALPHA .000 BETA .000

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, H_i/H_u

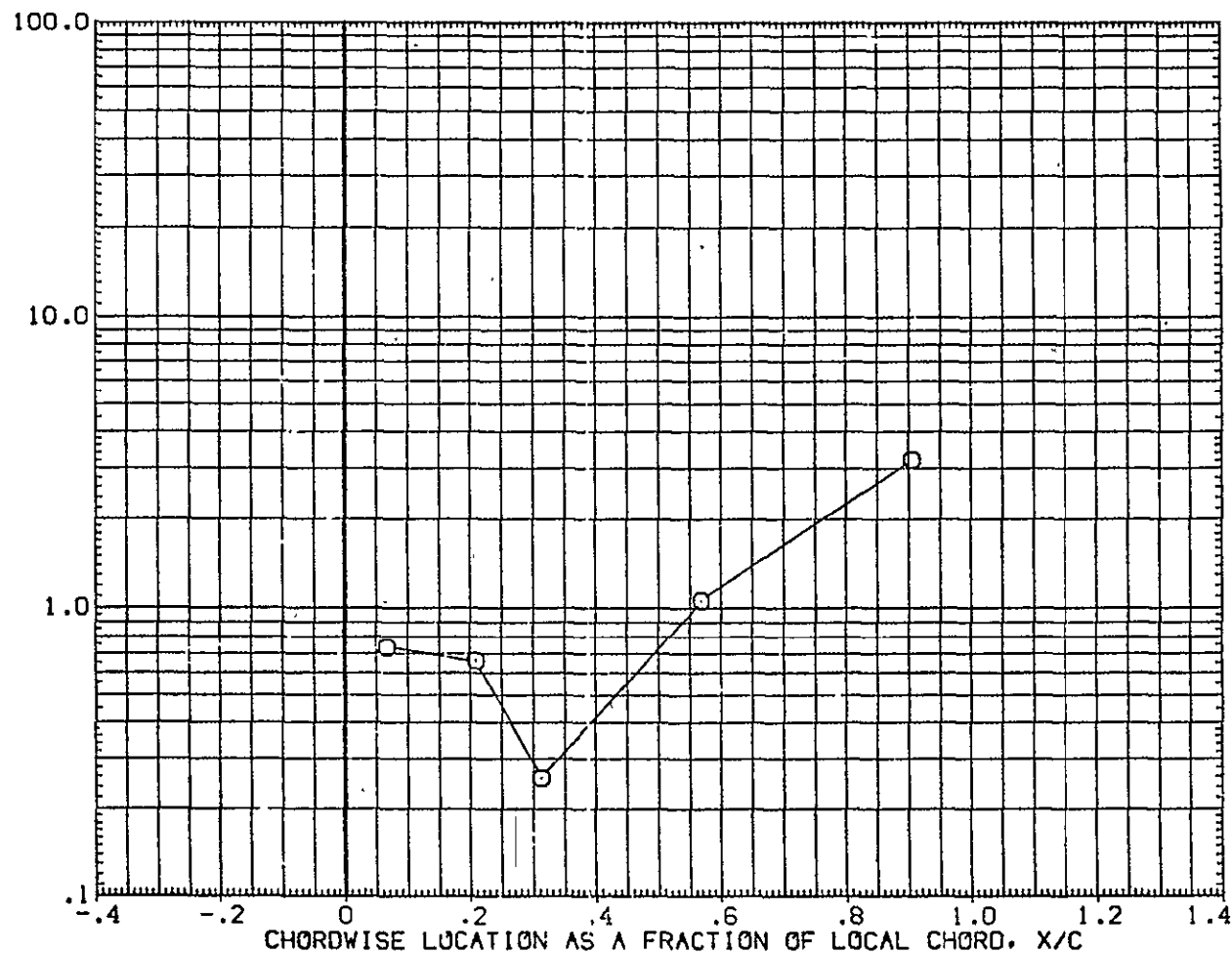


FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER ALPHA = 0

0H12 + 1H21 MODEL 37 OT(05)/O(07) WING L.S. (1UGW05)

| | | | | | | |
|--------|--------|------|-------|-------------------|------|------|
| SYMBOL | HAW/HT | 2Y/B | MACH | PARAMETRIC VALUES | | |
| O | .900 | .500 | 7.610 | ALPHA | BETA | .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, H_i/H_u

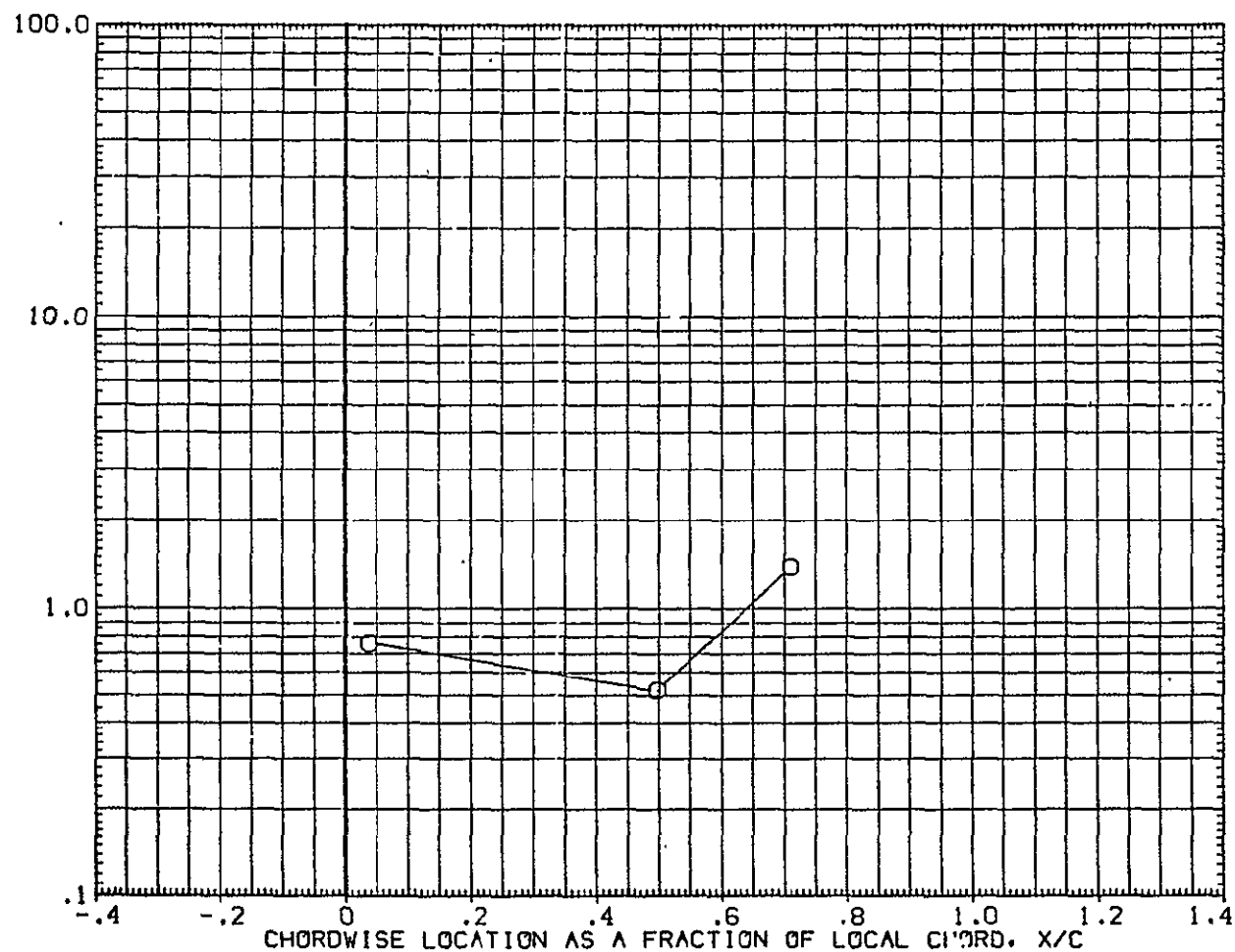


FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER ALPHA = 0

OH12 + IH21 MODEL 37 OT(05)/O(07) WING L.S. (IUGW05)

| | | | | | | | |
|--------|--------|------|-------|-------|-------------------|------|------|
| SYMBOL | HAW/HT | 2Y/B | MACH | ALPHA | PARAMETRIC VALUES | BETA | |
| O | .900 | .600 | 7.610 | | .000 | .000 | .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, H_i/H_u

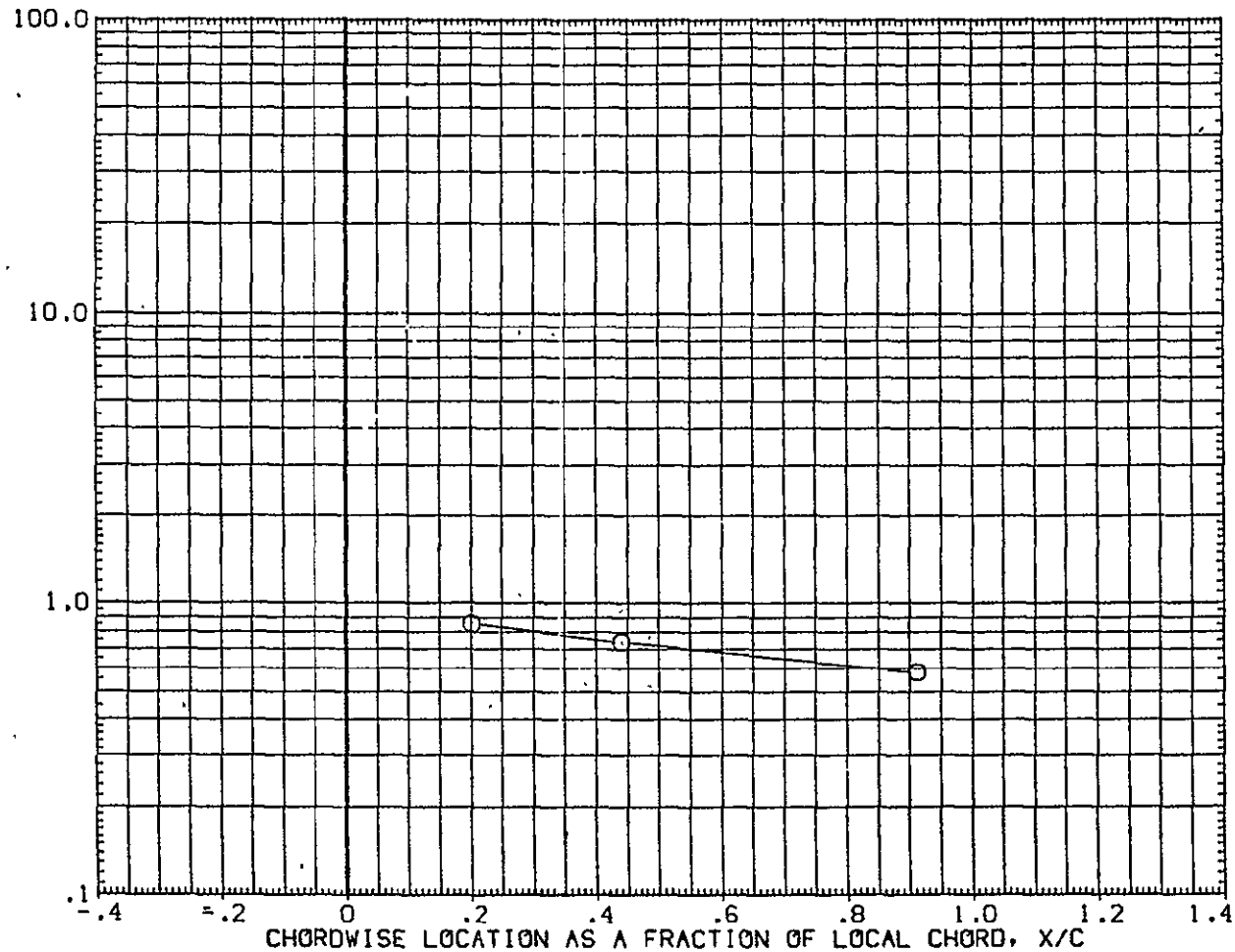


FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER ALPHA = 0

CH12 + IH21 MODEL 37 OT(05)/O(07) WING L.S. (IUGW05)

SYMBOL
O
HAW/HT
.900
2Y/B
.750
MACH
7.610

PARAMETRIC VALUES
ALPHA
.000
BETA
.000

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, H_i/H_u

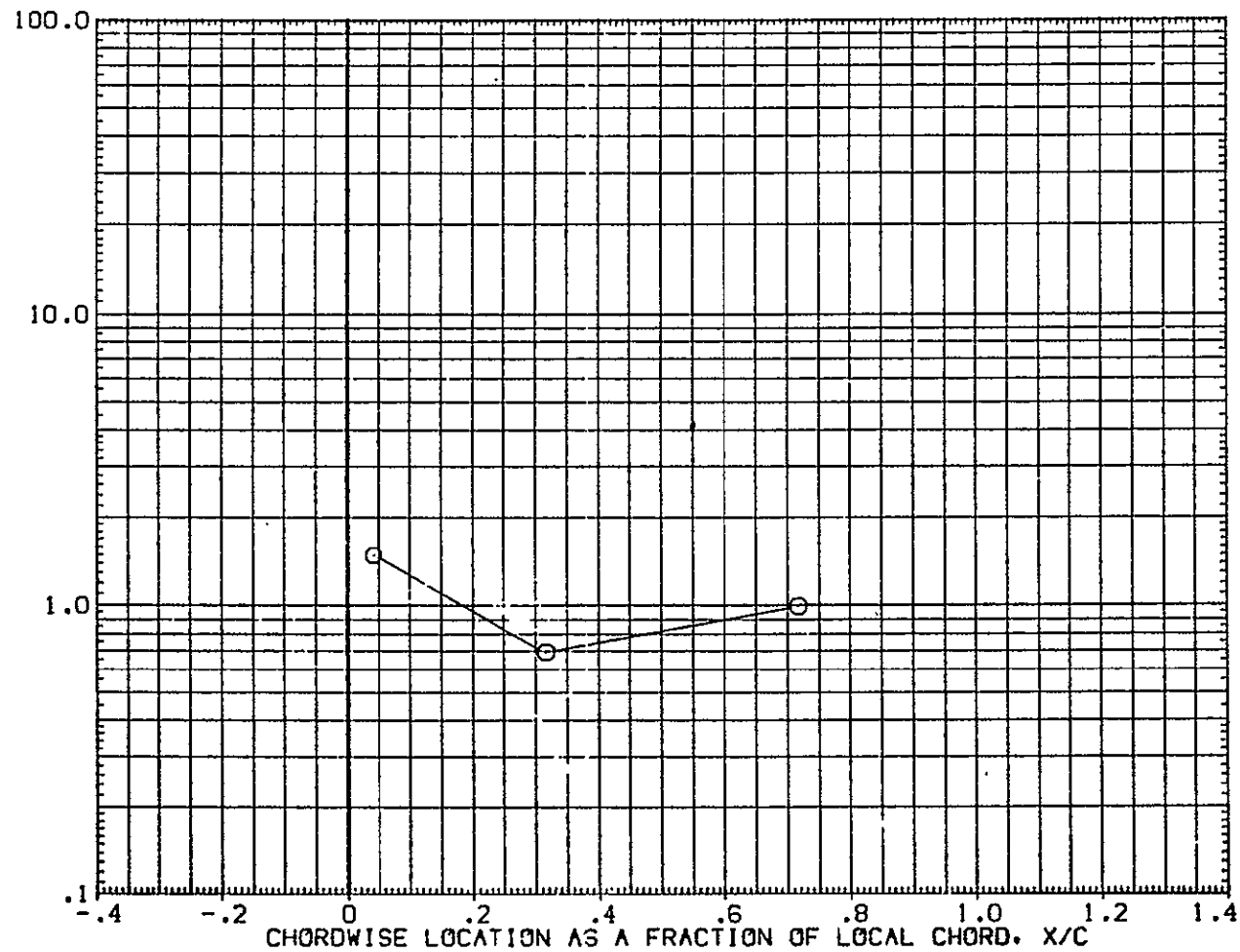


FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER ALPHA = 0

OH12 + IH21 MODEL 37 0T(05)/0(07) WING L.S. (JUGW05)

| | | | | | | |
|--------|--------|------|-------|-------------------|------|-----------|
| SYMBOL | HAW/HT | 2Y/B | MACH | PARAMETRIC VALUES | | |
| O | .900 | .950 | 7.610 | ALPHA | .000 | PETA .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, H_i/H_u

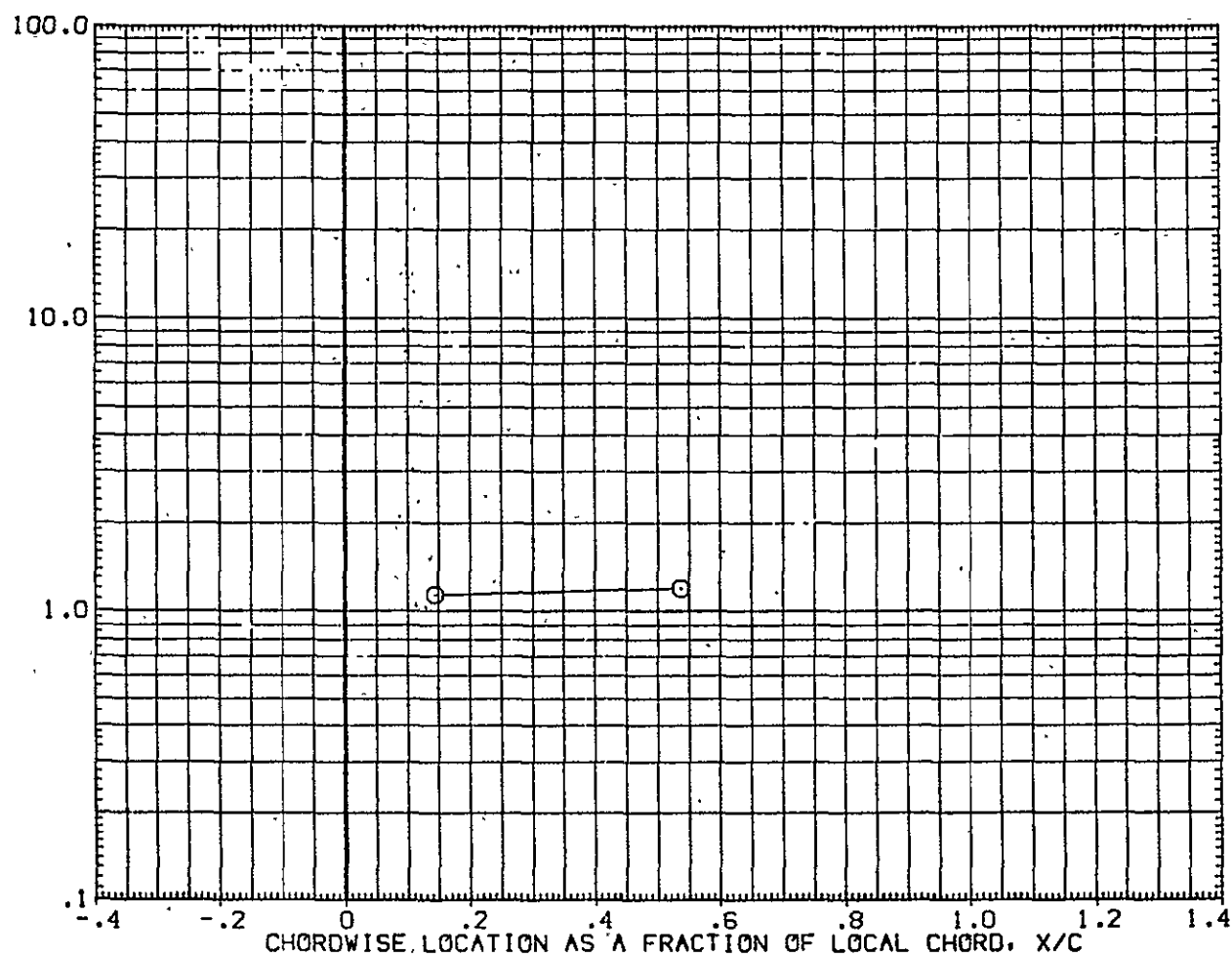


FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER ALPHA = 0

OH12 + IH21 MODEL 37 OT(05)/O(07) WING L.S. (IUGW05)

| | | | | | | |
|--------|--------|------|--------|-------------------|------|-----------|
| SYMBOL | HAW/HT | 2Y/B | MACH | PARAMETRIC VALUES | | |
| C | .900 | .250 | 18.300 | ALPHA | .000 | BETA .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, H_i/H_u

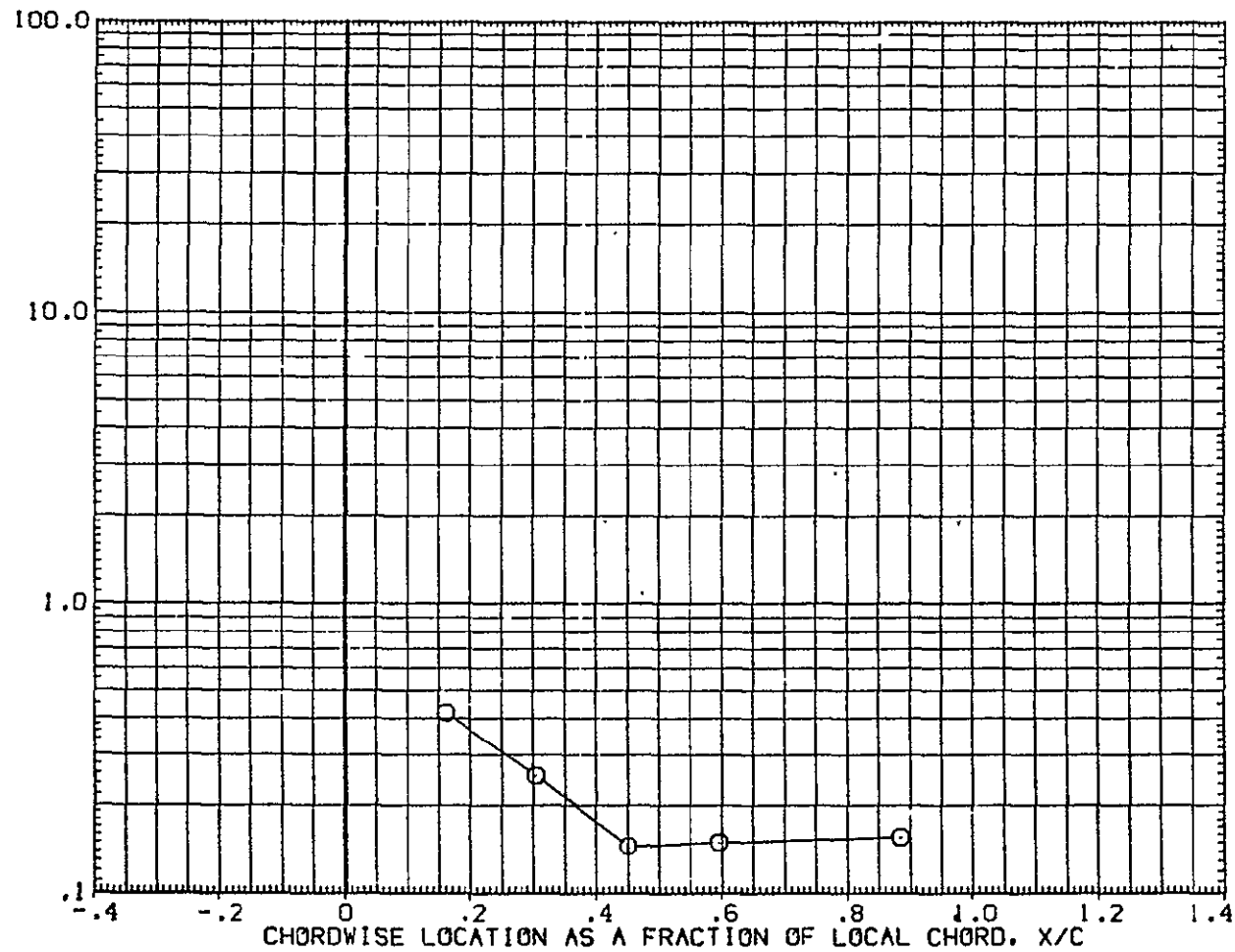


FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER ALPHA = 0

OH12 + IH21 MODEL 37 0T(05)/0(07) WING L.S. (IUG#05)

| | | | | | | | |
|--------|--------|------|--------|-------|-------------------|------|------|
| SYMBOL | HAW/HT | 2Y/B | MACH | ALPHA | PARAMETRIC VALUES | | |
| ○ | .900 | .400 | 18.300 | | .000 | SETA | .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, H_i/H_u

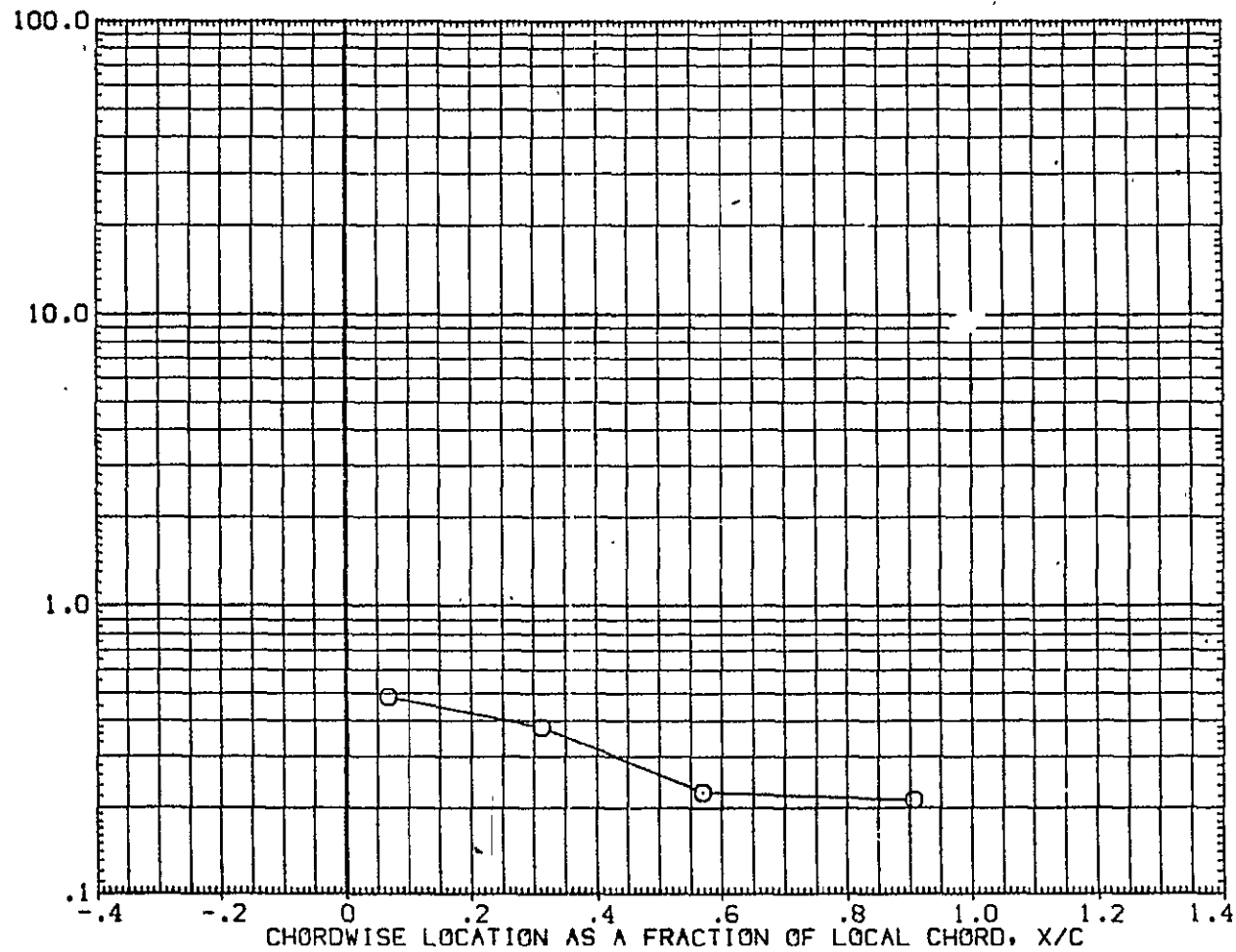


FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER $\alpha = 0$

OH12 + IH21 MODEL 37 0T(05)/0(07) WING L.S. (IUGW05)

| | | | | |
|--------|--------|------|--------|----------------------|
| SYMBOL | HAW/HT | 2Y/B | MACH | PARAMETRIC VALUES |
| O | .900 | .500 | 18.300 | ALPHA .000 BETA .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, H_i/H_u

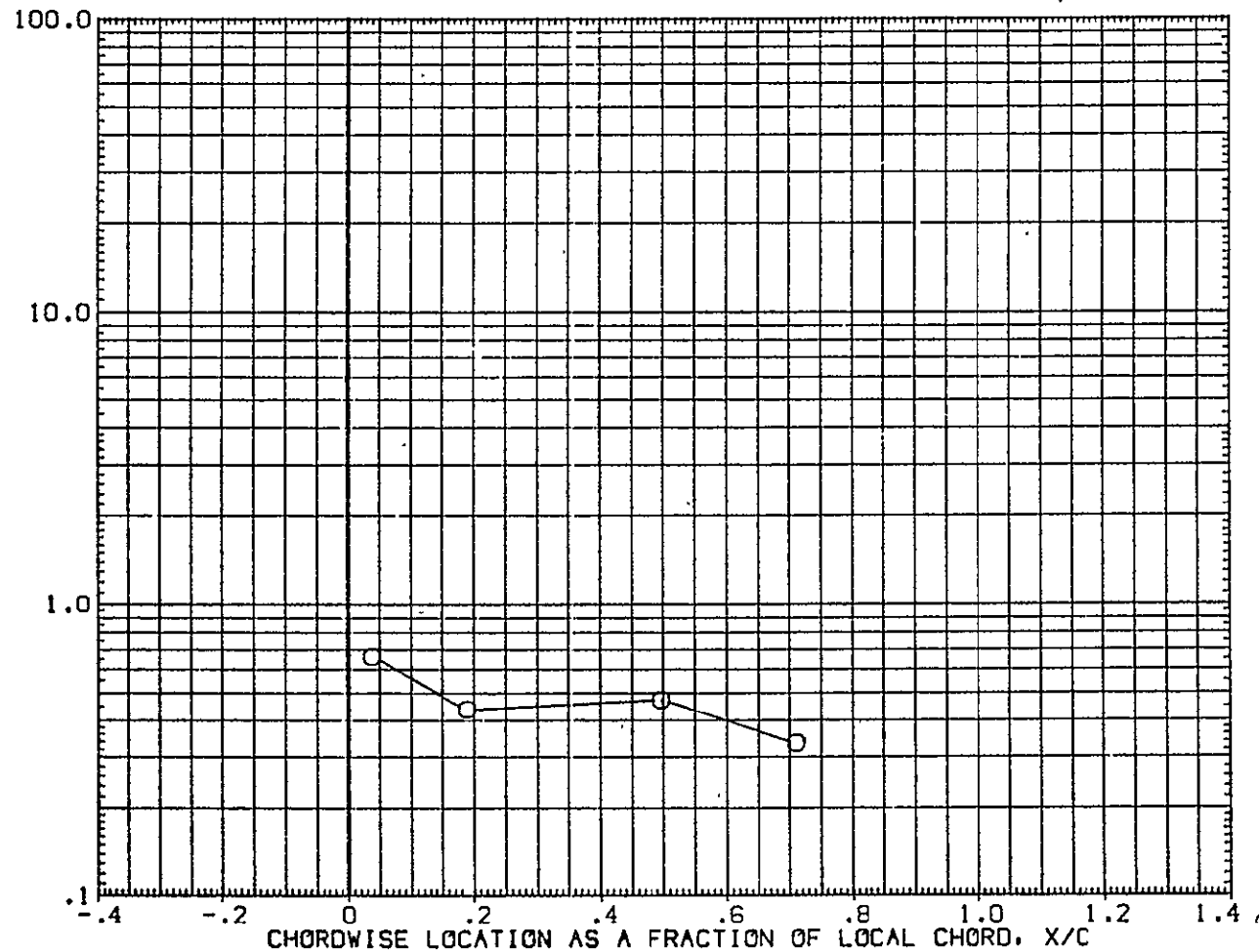


FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER ALPHA = 0

OH12 + 1H21 MODEL 37 OT(05)/0(07) WING L.S. (IUGW05)

| | | | | | | |
|--------|--------|------|--------|-------------------|------|-----------|
| SYMBOL | HAW/HT | 2Y/B | MACH | PARAMETRIC VALUES | | |
| O | .900 | .600 | 18.300 | ALPHA | .000 | BETA .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, H_i/H_u

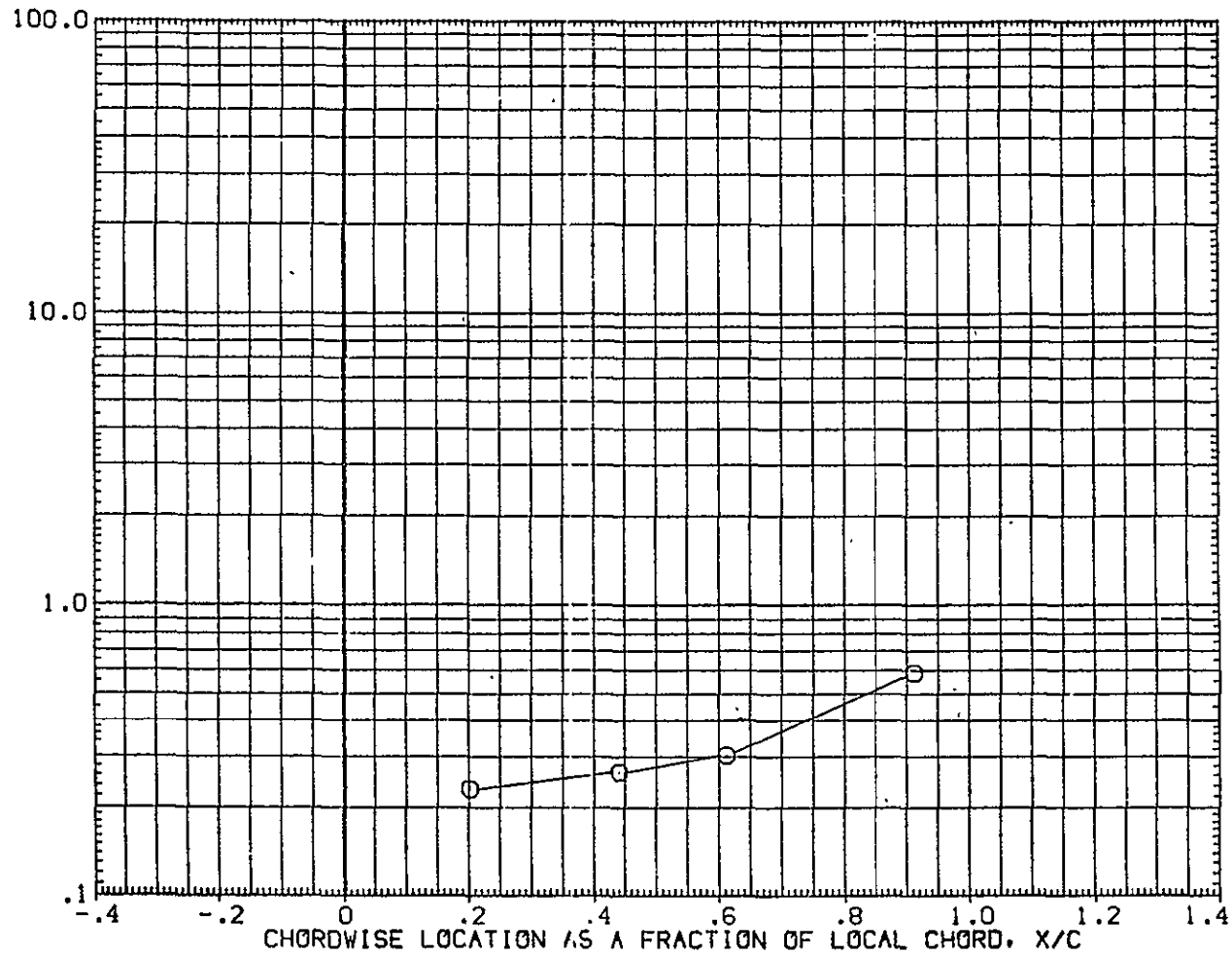


FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER $\alpha = 0$

OH12 + IH21 MODEL 37 OT(05)/0(07) WING L.S. (IUGW05)

| | | | | |
|--------|--------|------|--------|----------------------|
| SYMBOL | HAW/HT | 2Y/B | MACH | PARAMETRIC VALUES |
| O | .900 | .750 | 18.300 | ALPHA .000 BETA .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, H_i/H_u

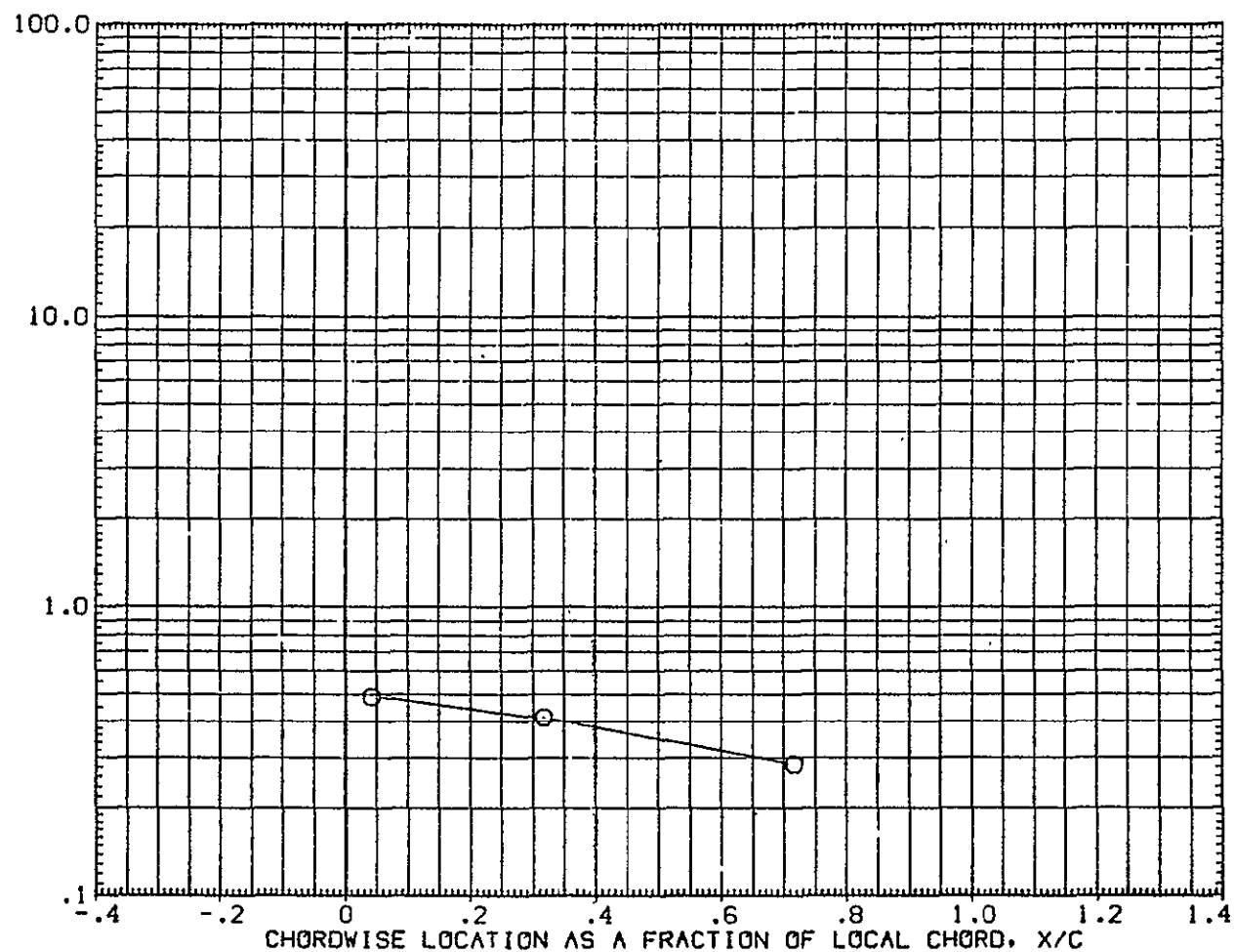


FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER ALPHA = 0~

0H12 + 1H21 MODEL 37 0T(05)/0(07) WING L.S. (IUGW05)

| | | | | | | | |
|--------|--------|------|--------|-------|-------------------|------|------|
| SYMBOL | HAW/HT | 2Y/B | MACH | ALPHA | PARAMETRIC VALUES | BETA | |
| ○ | .900 | .950 | 18.300 | | .000 | | .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, H_i/H_u

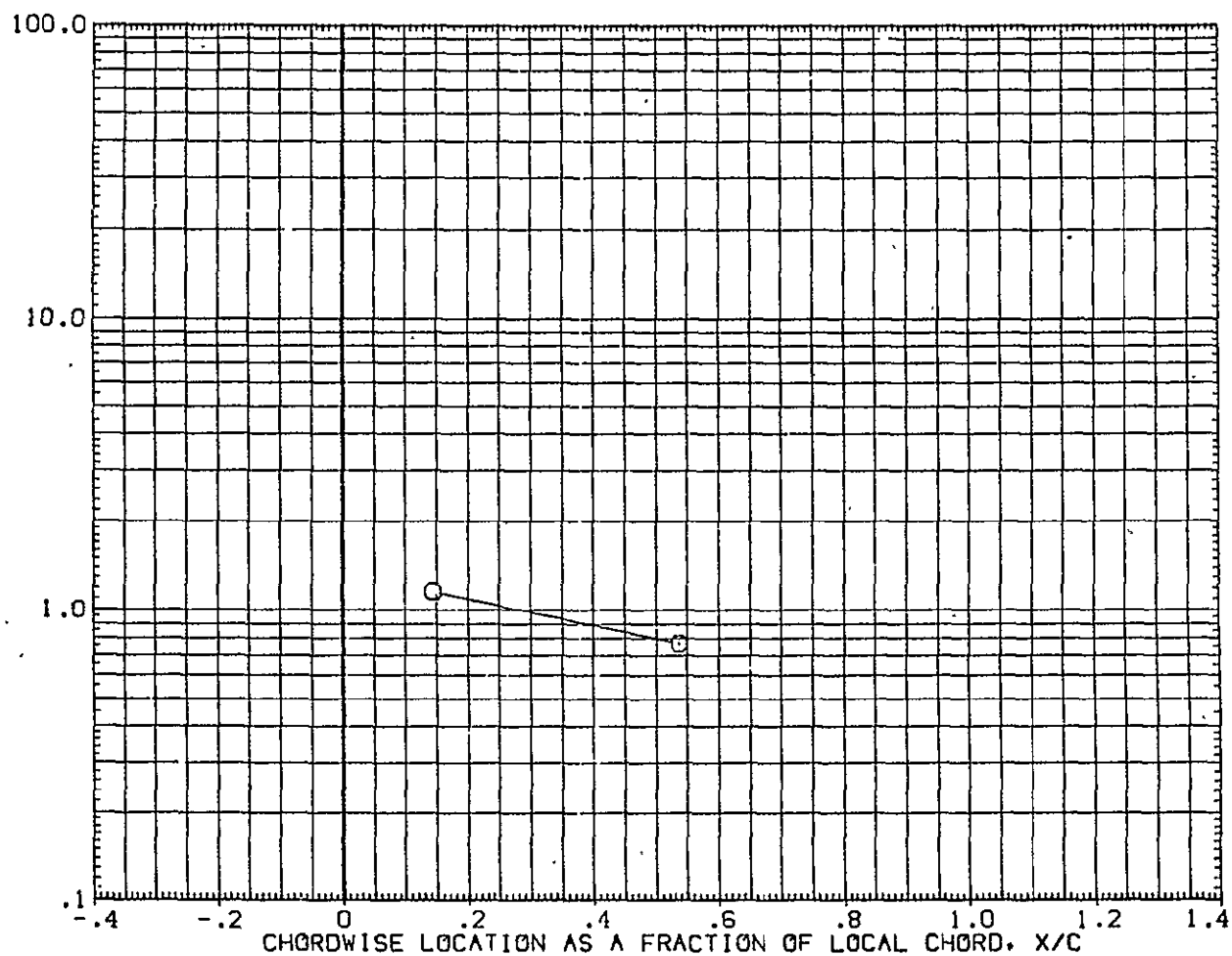


FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER $\alpha = 0$

OH12 + IH21 MODEL 37 OT(05)/O(07) WING L.S. (IUGW05)

| | | | | | | |
|--------|--------|------|--------|-------------------|------|-----------|
| SYMBOL | HAW/HT | 2r/B | MACH | PARAMETRIC VALUES | | |
| ○ | .900 | .250 | 19.180 | ALPHA | .000 | BETA .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, H_i/H_u

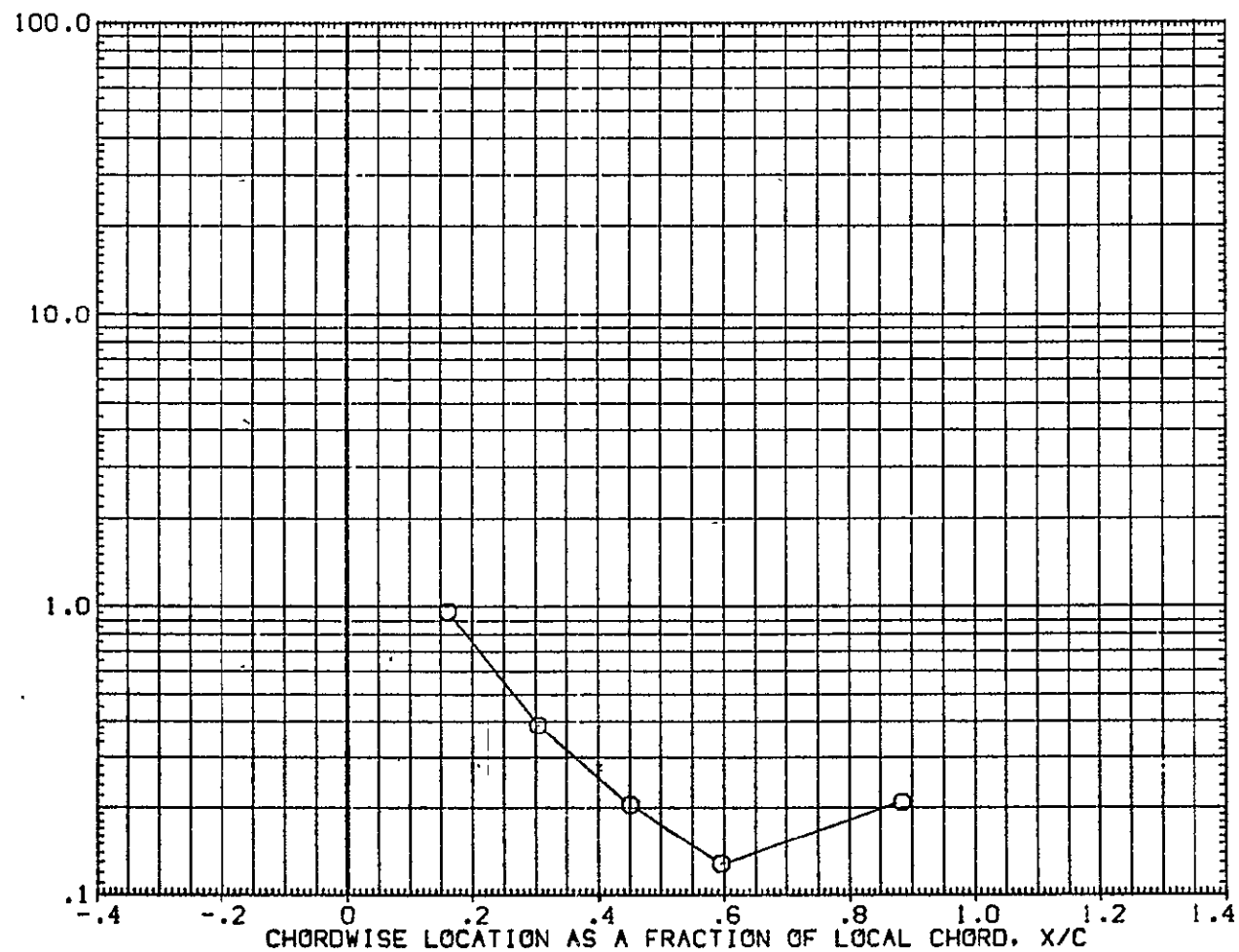


FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER ALPHA = 0

REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR

OH12 + IH21 .MODEL 37 OT(05)/O(07) WING L.S. (IUGW05)

| | | | | | | |
|--------|--------|------|--------|-------------------|------|-----------|
| SYMBOL | HAW/HT | 2Y/B | MACH | PARAMETRIC VALUES | | |
| O | .900 | .400 | 19.180 | ALPHA | .000 | BETA .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, H_i/H_u

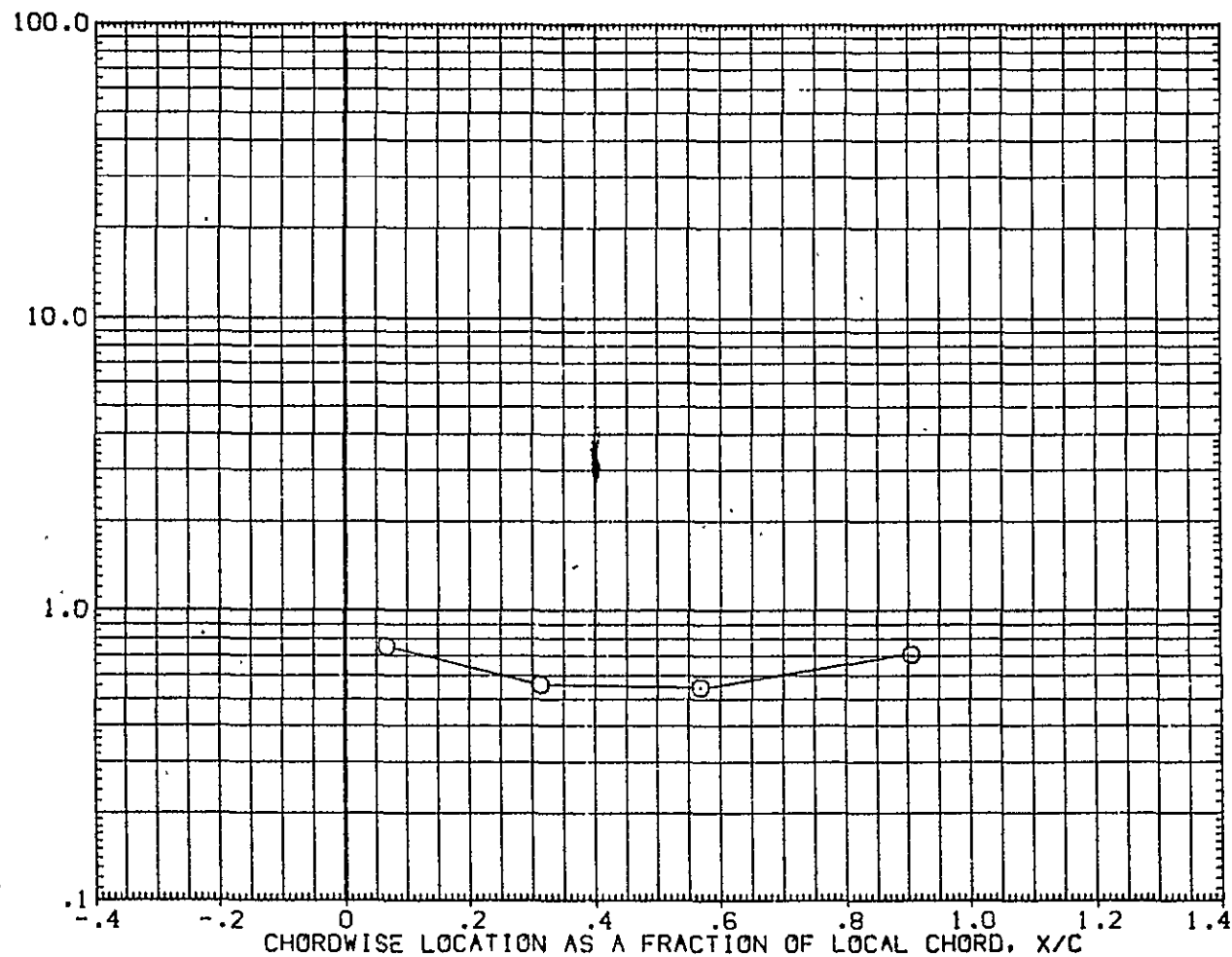


FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER $\alpha = 0$

0H12 + 1H21 MODEL 37 0T(05)/0(07) WING L.S. (IUGW05)

| | | | | | | |
|--------|--------|------|--------|-------------------|------|-----------|
| SYMBOL | HAW/HT | 2Y/B | MACH | PARAMETRIC VALUES | | |
| ○ | .900 | .500 | 19.180 | ALPHA | .000 | BETA .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, H_i/H_u

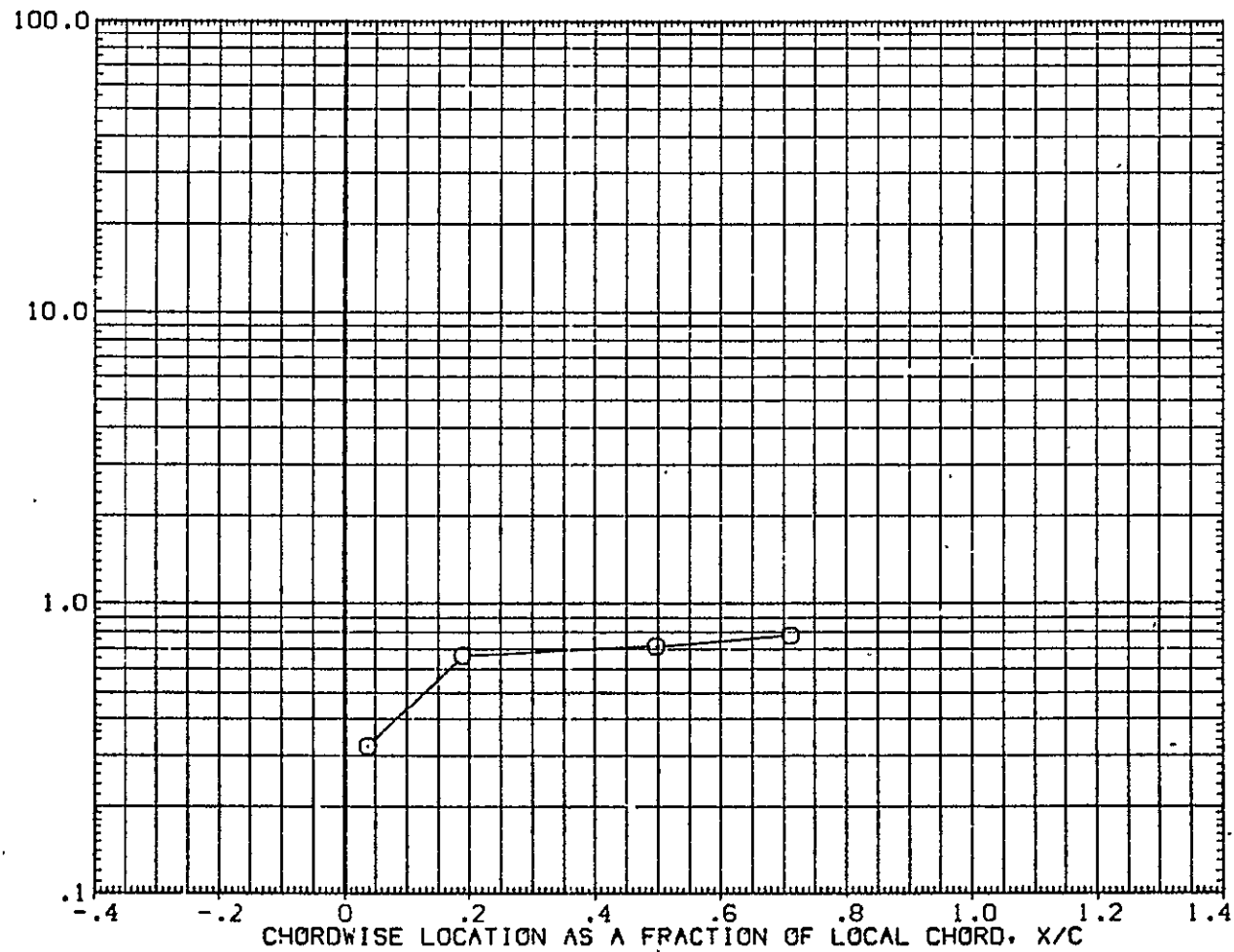


FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER. ALPHA = 0

OH12 + IH21 MODEL 37 OT(05)/0(07) WING L.S. (IUGW05)

| | | | | | | |
|--------|--------|------|--------|-------------------|------|-----------|
| SYMBOL | HAW/HT | 2Y/B | MACH | PARAMETRIC VALUES | | |
| O | .900 | .600 | 19.180 | ALPHA | .000 | BETA .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU

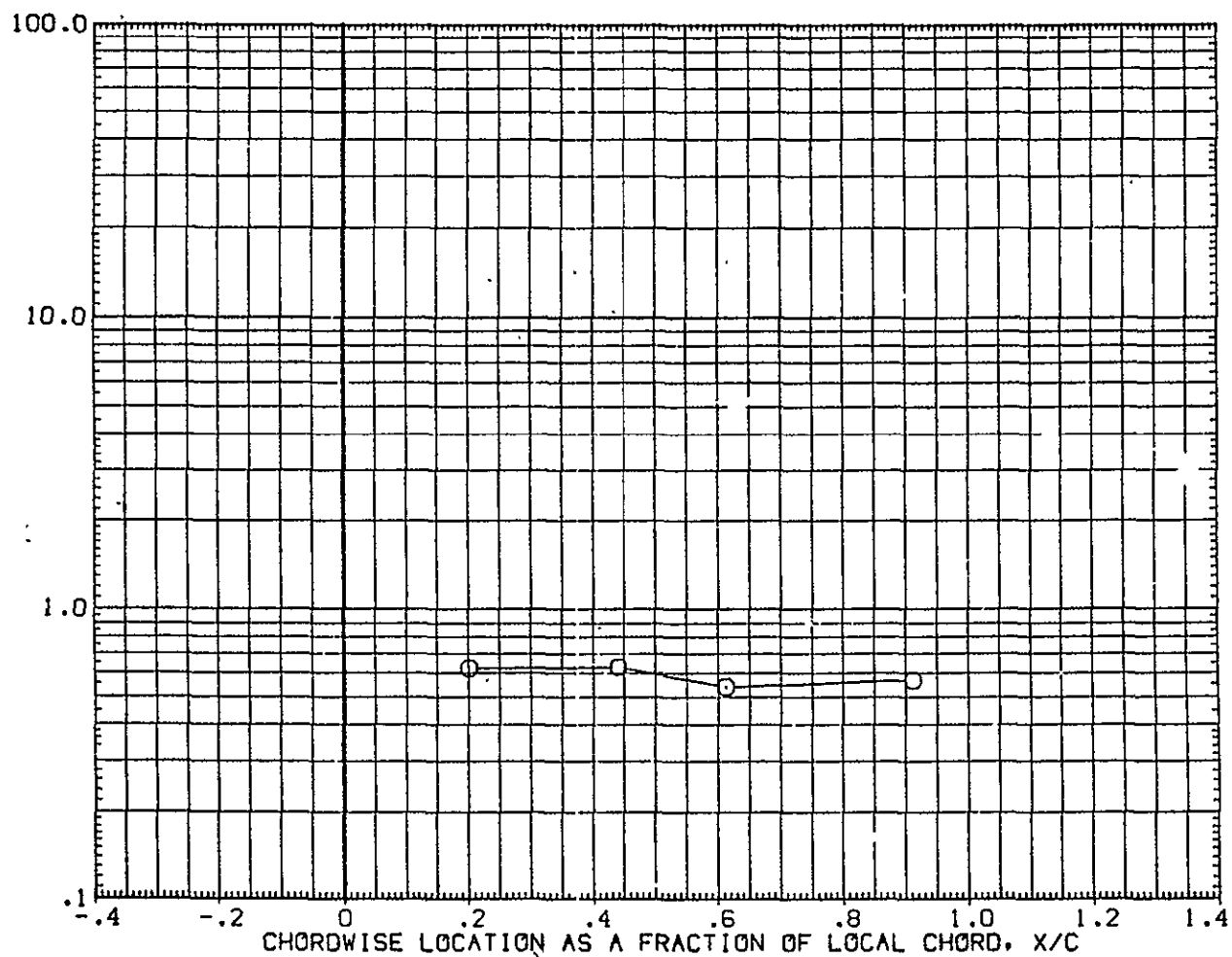


FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER ALPHA = 0

OH12 + IH21 MODEL 37 01(05)/0(07) WING L.S. (IUGW05)

| | | | | | | | |
|--------|--------|------|--------|-------|-------------------|------|--|
| SYMBOL | HAW/HT | ZY/B | MACH | ALPHA | PARAMETRIC VALUES | BETA | |
| ○ | .900 | .750 | 19.180 | .000 | .000 | .000 | |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, H_i/H_u

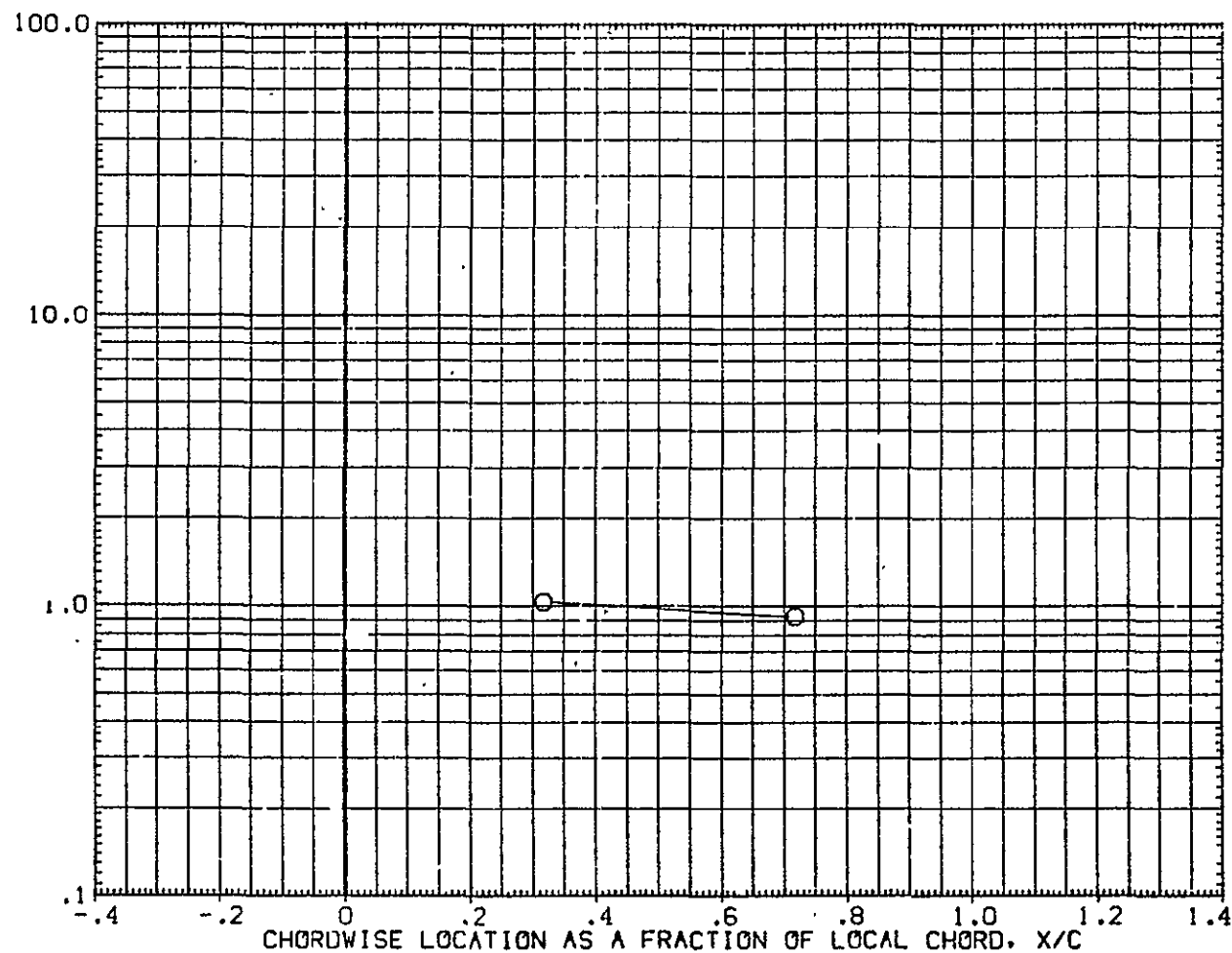


FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER $\alpha = 0^\circ$

OH12 + IH21 MODEL 37 OT(05)/O(07) WING L.S. (IUGW05)

SYMBOL
O
HAW/HT
.900
ZY/B
.950
MACH
19.180

PARAMETRIC VALUES
ALPHA
.000
BETA
.000

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, H_i/H_u

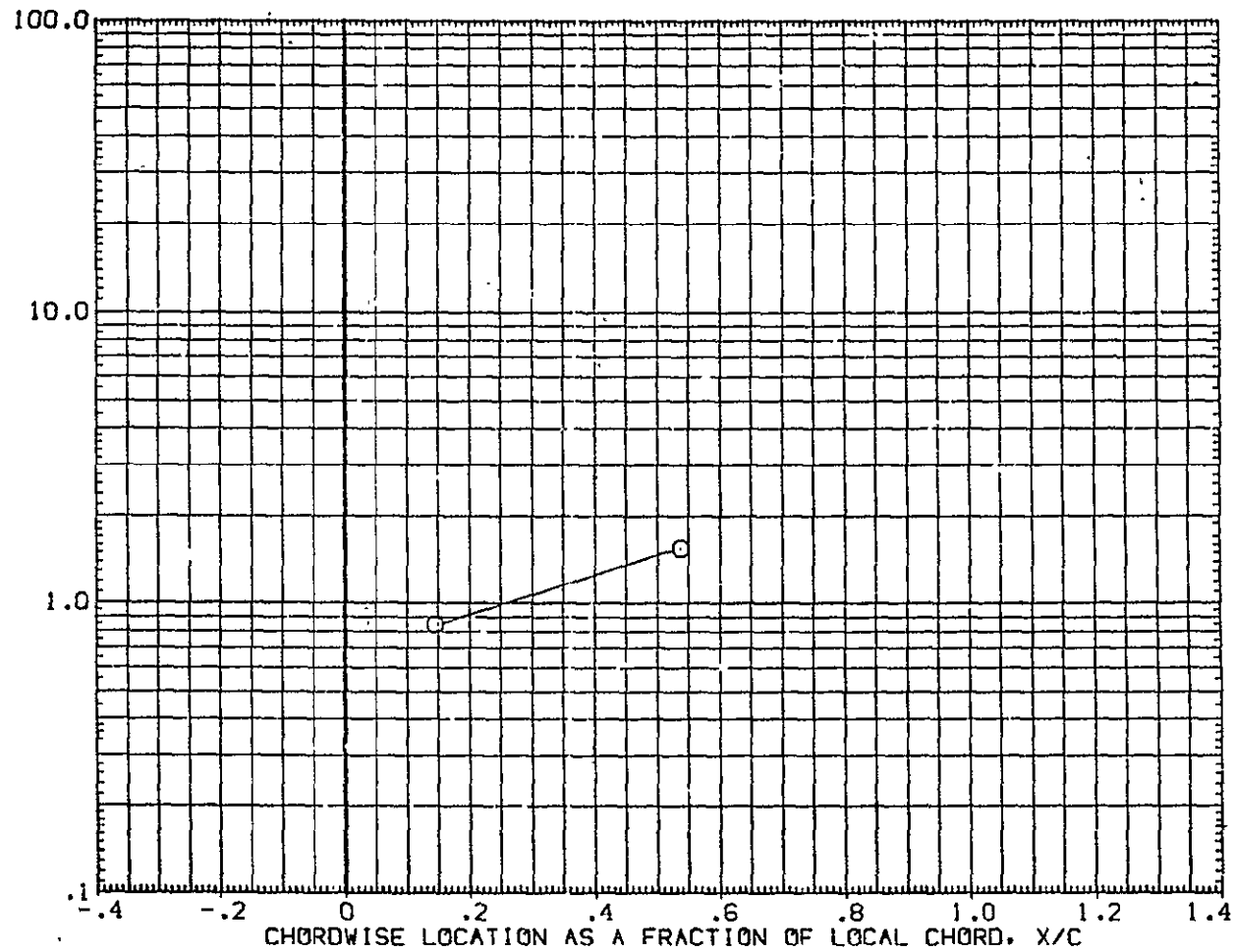


FIG. 9 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER ALPHA = 0

0H12/1H21 (CAL HST 173-100) 37 0

VERTICAL (RUGV07)

| SYMBOL | HAW/WT | GAGENO | MACH | PARAMETRIC VALUES | |
|--------|--------|--------|-------|-------------------|------|
| | | | | ALPHA | BETA |
| ○ | .850 | 40.000 | 5.997 | .000 | .000 |
| □ | .300 | | | | |
| ◇ | 1.000 | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

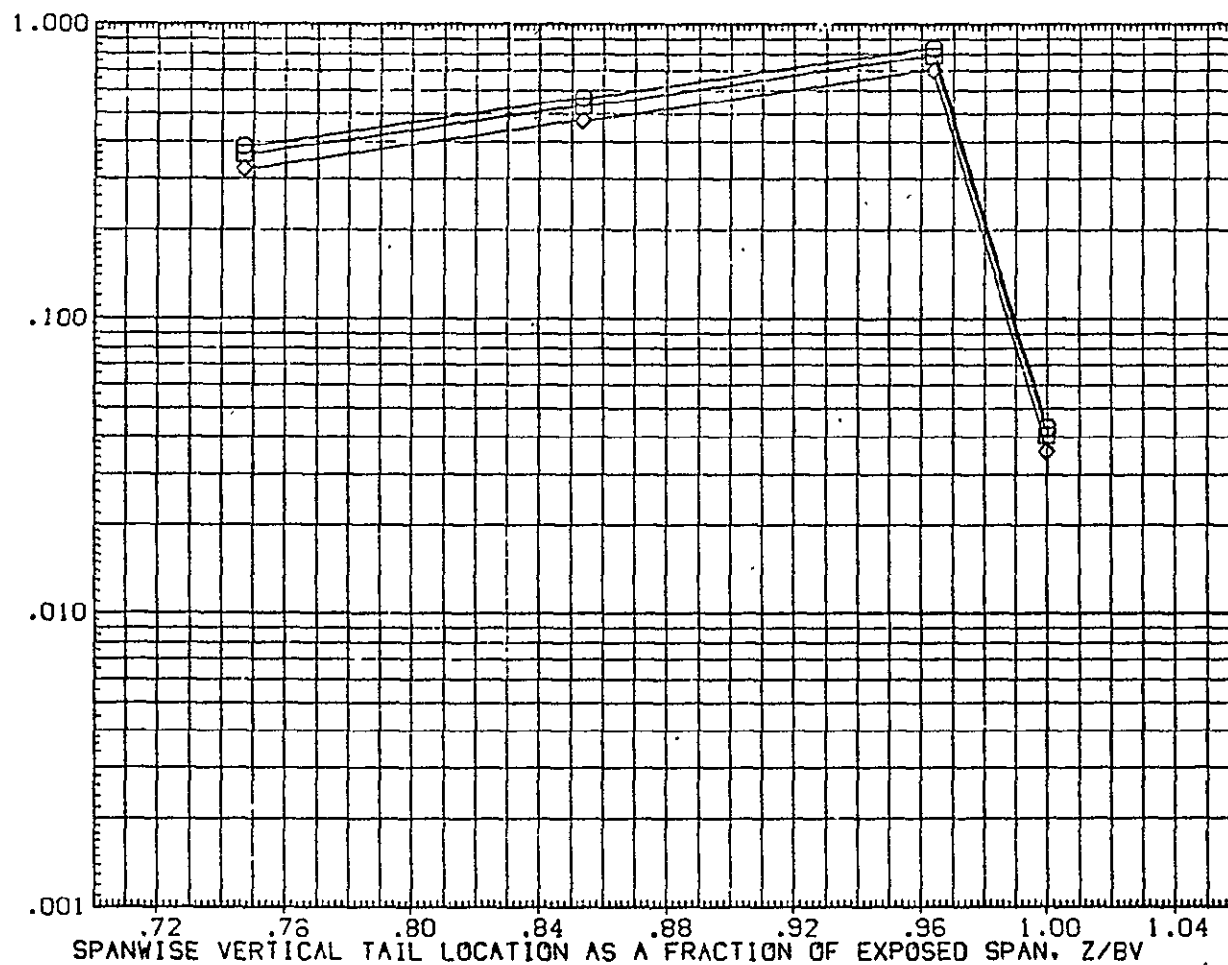


FIG. 10 EFFECT OF RECOVERY FACTOR ON THE ORBITER TAIL HEAT TRANSFER ALPHA = 0

0H12/1H21 (CAL HST 173-100) 37 0

VERTICAL (RUGV07)

| SYMBOL | HAU/HT | GAGENO | MACH | PARAMETRIC VALUES | | |
|--------|--------|--------|-------|-------------------|------|-----------|
| □ | .850 | 40.000 | 7.614 | ALPHA | .000 | BETA .000 |
| ◇ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, h/h_{REF}

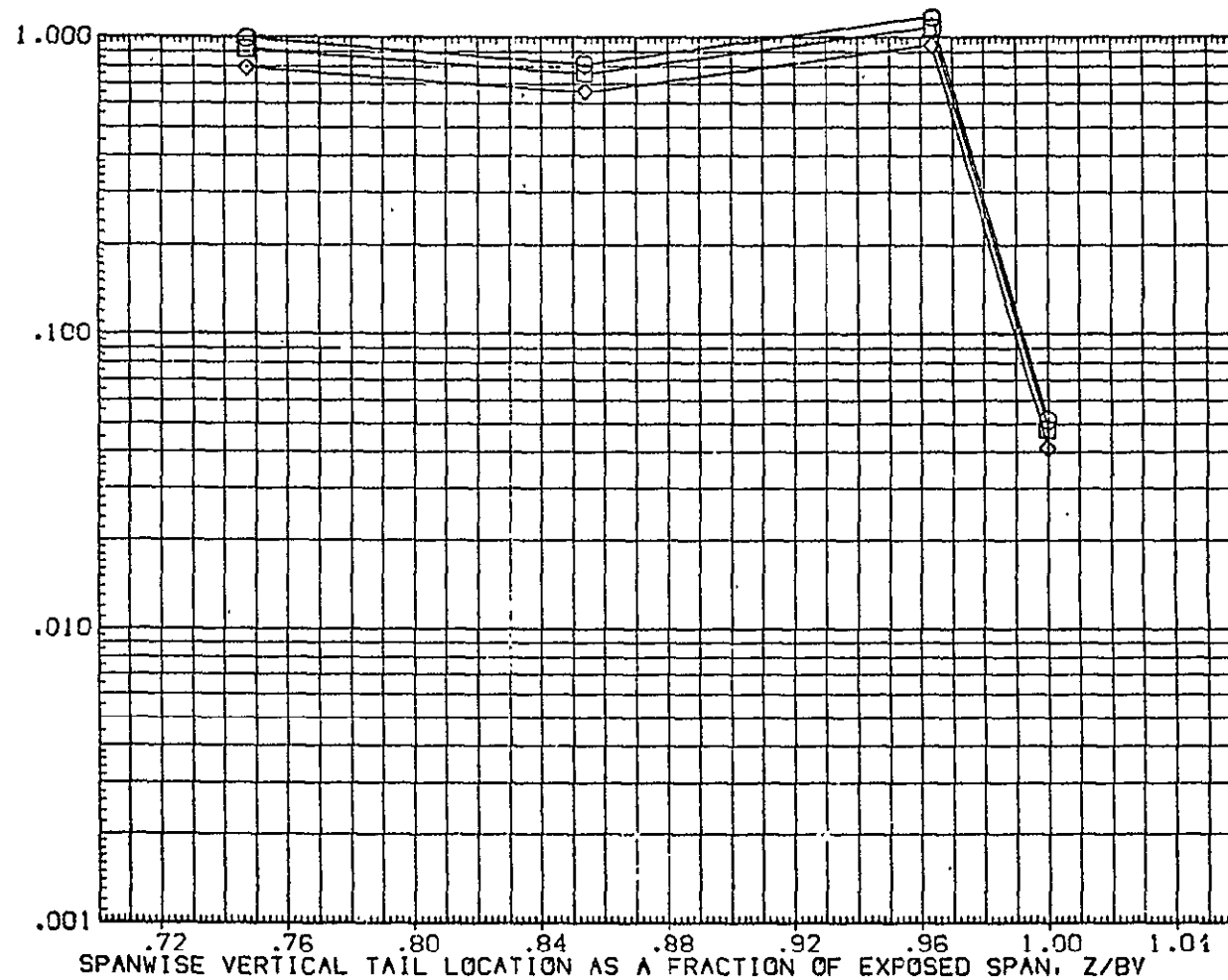


FIG. 10 EFFECT OF RECOVERY FACTOR ON THE ORBITER TAIL HEAT TRANSFER ALPHA = 0

0H12/1H21 (CAL HST 173-100) 37 0

VERTICAL (RUGV07)

| SYMBOL | HAW/HT | GAGE NO | MACH | PARAMETRIC VALUES |
|--------|--------|---------|--------|----------------------|
| ○ | .850 | 40.000 | 16.000 | ALPHA .000 BETA .000 |
| □ | .900 | | | |
| ◇ | 1.000 | | | |

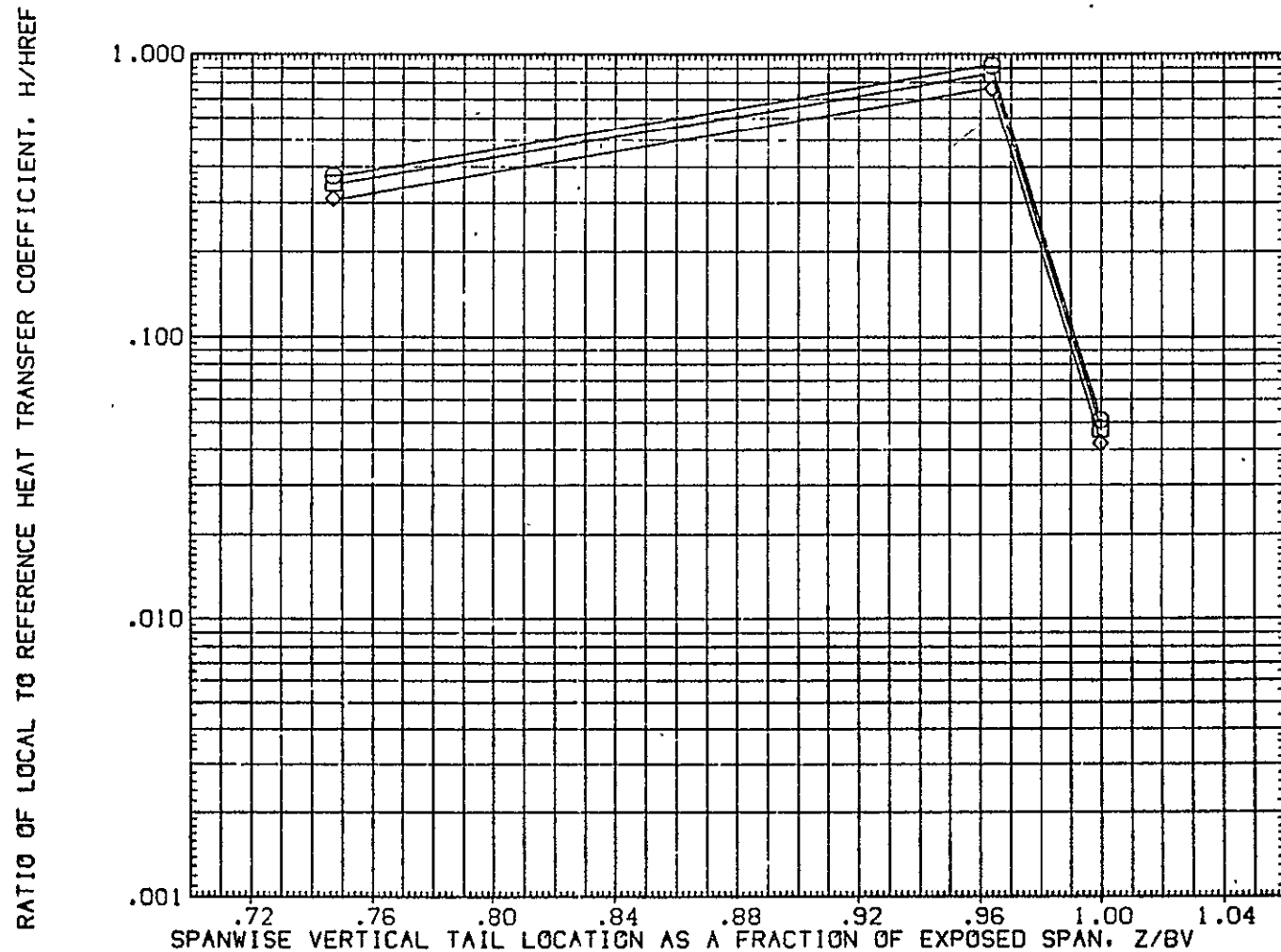
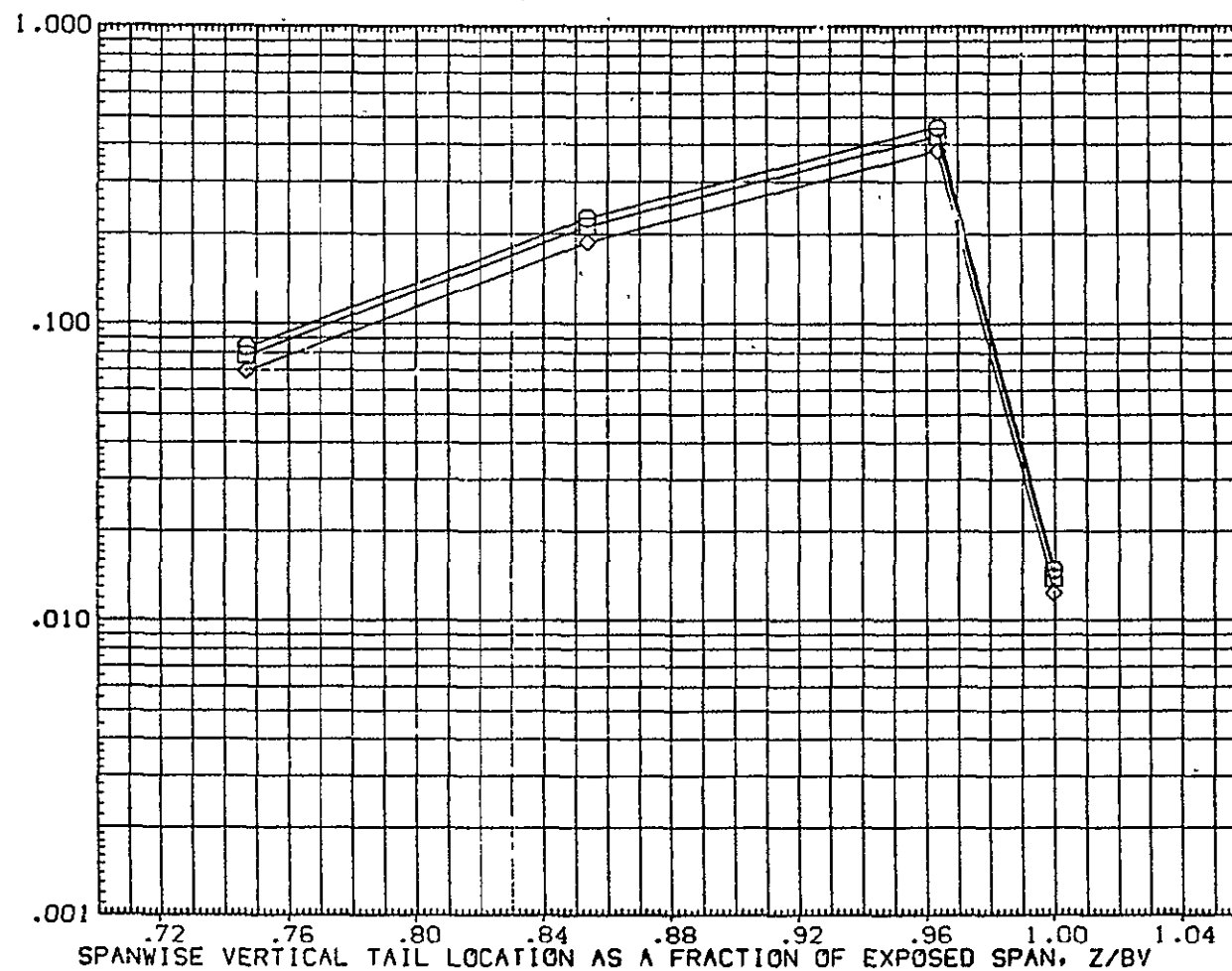


FIG. 10 EFFECT OF RECOVERY FACTOR ON THE ORBITER TAIL HEAT TRANSFER ALPHA = 0

0H12/1H21 (CAL HST 173-100) 37 0

VERTICAL (RUGV07)

| SYMBOL | HAW/HT | GAGE/0 | MACH | PARAMETRIC VALUES | | |
|--------|--------|--------|--------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| ○ | .950 | 40.000 | 18.31° | .000 | .000 | .000 |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, h/h_{REF} FIG. 10 EFFECT OF RECOVERY FACTOR ON THE ORBITER TAIL HEAT TRANSFER $\alpha = 0$

0H12/1H21 (CAL HST 173-100) 37 0

VERTICAL (RUGV07)

SYMBOL
 \diamond \square \circ
 1.000
 .900
 .800

HAW/HT 850
 GAGENO 40.000
 MACH 19.190

PARAMETRIC VALUES
 ALPHA .000 BETA .000

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

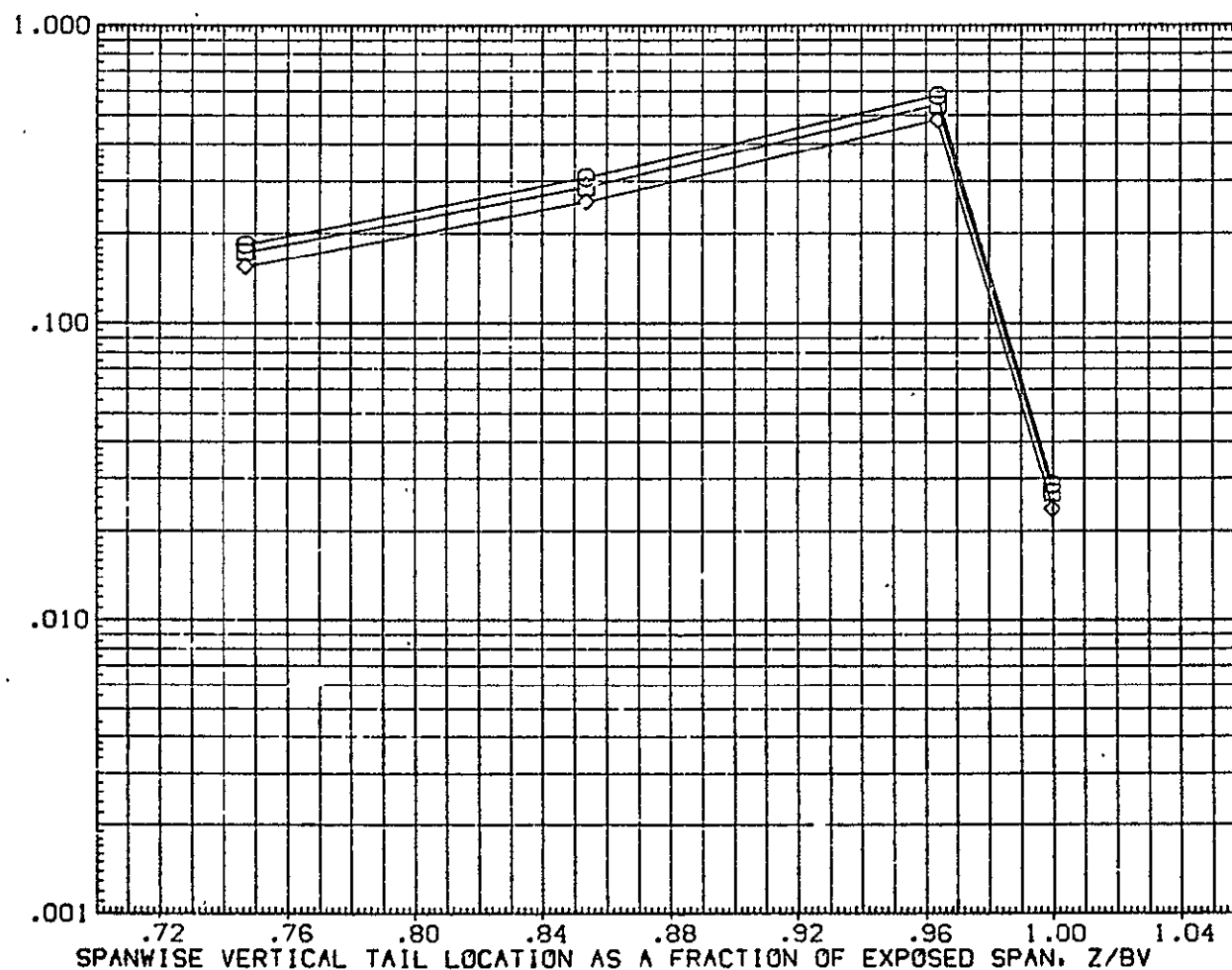


FIG. 10 EFFECT OF RECOVERY FACTOR ON THE ORBITER TAIL HEAT TRANSFER ALPHA = 0

OH12/IH21 (CAL HST 173-100) 37 0 T VERTICAL (RUGV05)

| SYMBOL | HAW/HT | GAGENO | MACH | PARAMETRIC VALUES | | |
|--------|--------|--------|-------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| ◇ | .850 | 40.000 | 6.999 | .000 | | .000 |
| □ | .900 | | | | | |
| ○ | 1.000 | | | | | |

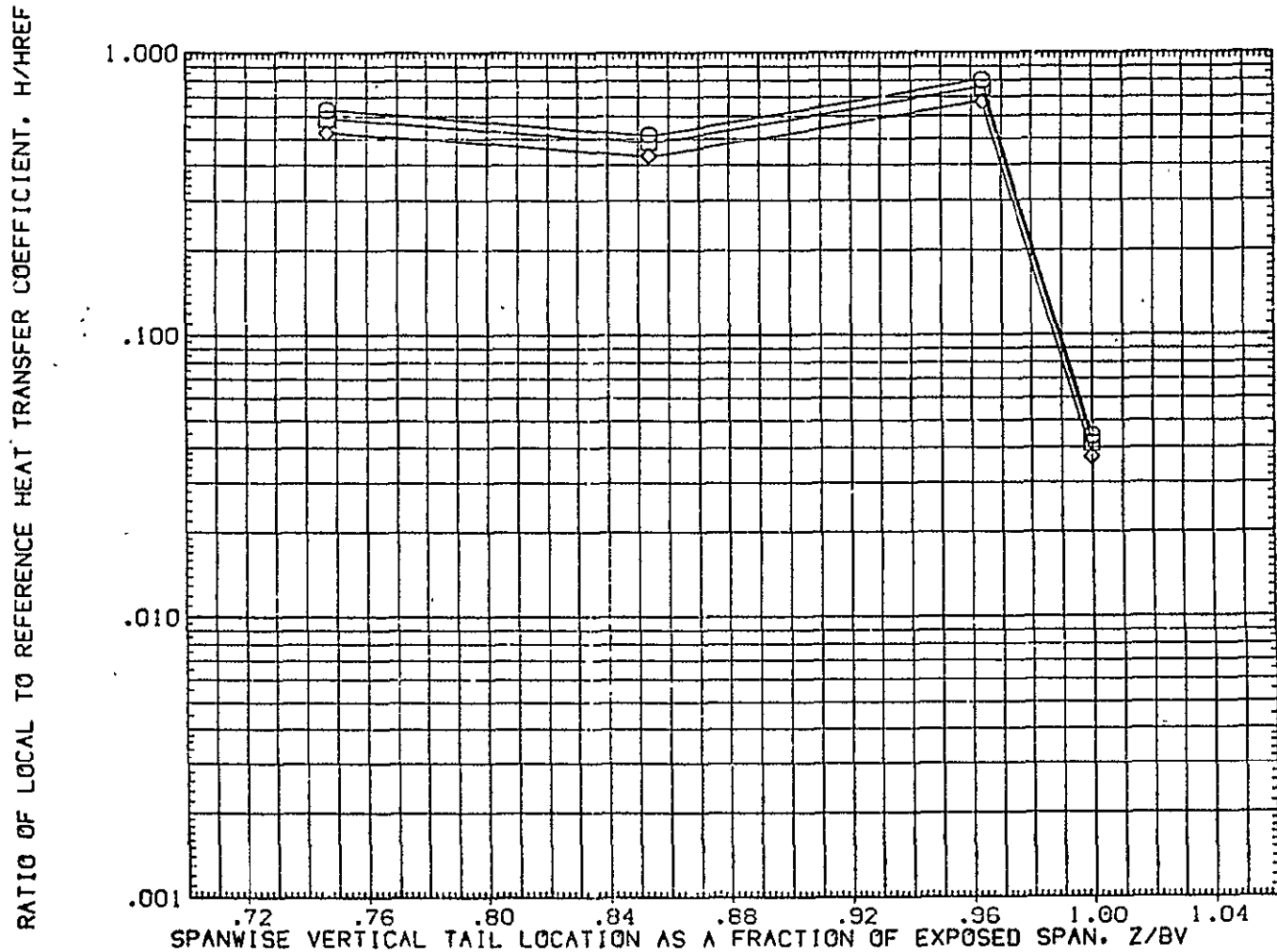


FIG. 10 EFFECT OF RECOVERY FACTOR ON THE ORBITER TAIL HEAT TRANSFER ALPHA = 0

OH12/IH21 (CAL HST 173-100) 37 0 T VERTICAL (RUGV05)

| | | | | | | |
|--------|--------|--------|-------|-------|-------------------|------|
| SYMBOL | HAW/HT | GAGENO | MACH | ALPHA | PARAMETRIC VALUES | |
| □ | .850 | 40.000 | 7.616 | .000 | BETA | .000 |
| ◇ | 1.000 | | | | | |

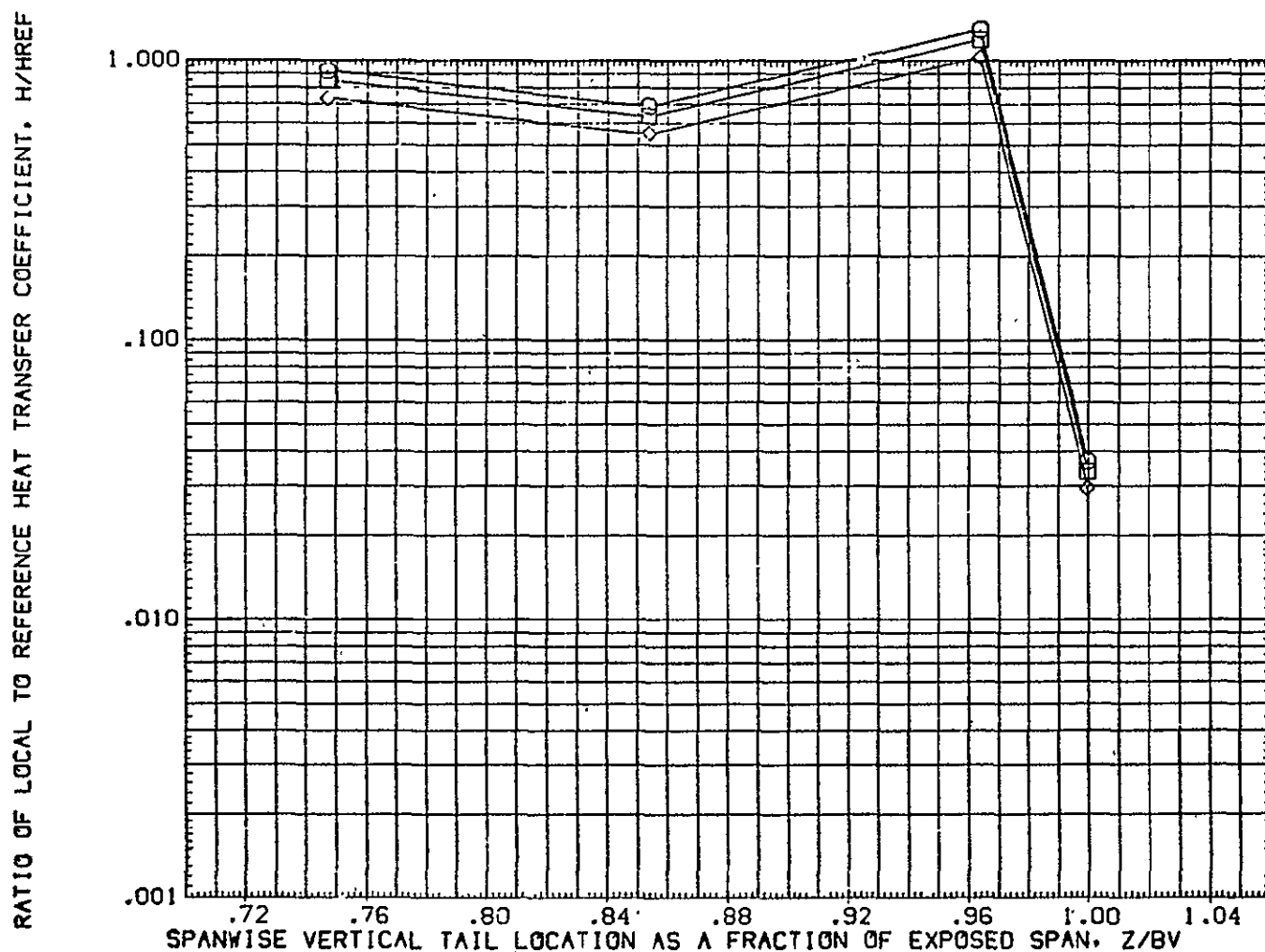


FIG. 10 EFFECT OF RECOVERY FACTOR ON THE ORBITER TAIL HEAT TRANSFER ALPHA = 0

0H12/IH21 (CAL HST 173-100) 37 0 T VERTICAL (RUGV05)

| SYMBOL | HAW/HT | GAGENO | MACH | PARAMETRIC VALUES | | |
|--------|--------|--------|--------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| ○ | .850 | 40.000 | 18.330 | .000 | | .000 |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

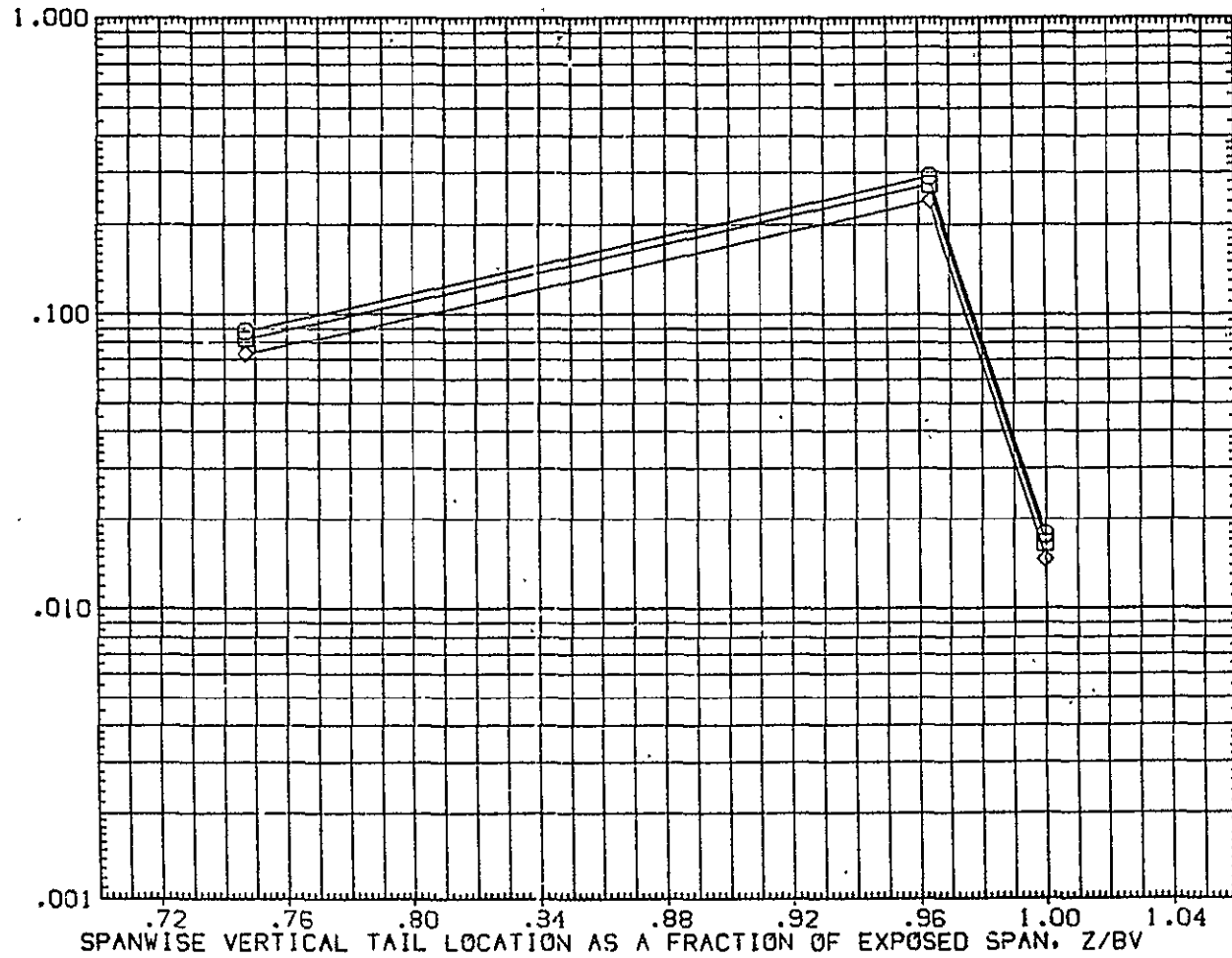


FIG. 10 EFFECT OF RECOVERY FACTOR ON THE ORBITER TAIL HEAT TRANSFER ALPHA = 0

REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR.

OH12/IH21 (CAL HST 173-100) 37 0 T VERTICAL (RUGV05)

| | | | | | | | |
|--------|--------|---------|--------|-------------------|------|------|------|
| SYMBOL | HAW/HT | GAGE NO | MACH | PARAMETRIC VALUES | | | |
| ○ | .850 | 40.000 | 19.200 | ALPHA | .000 | BETA | .000 |
| □ | .900 | | | | | | |
| ◇ | 1.000 | | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, h/h_{ref}

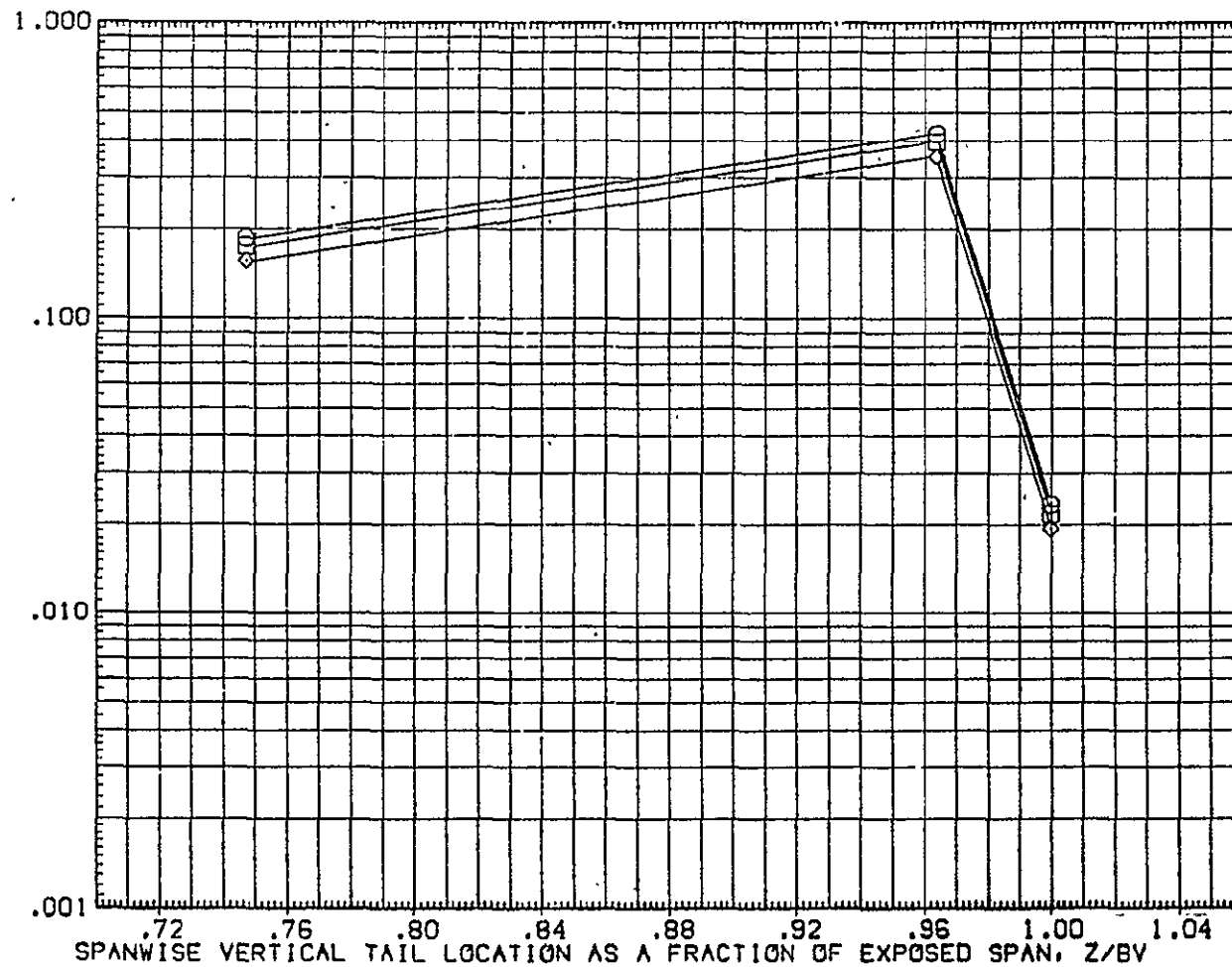


FIG. 10 EFFECT OF RECOVERY FACTOR ON THE ORBITER TAIL HEAT TRANSFER $\alpha = 0$

0H12 + IH21 MODEL 37 0T(05)/0(07) VERTICAL (IUGV05)

SYMBOL
O
MAW/HT
.900
GAGE/HO
40.000
MACH
7.000

PARAMETRIC VALUES
ALPHA
.000
BETA
.000

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, H_i/H_u

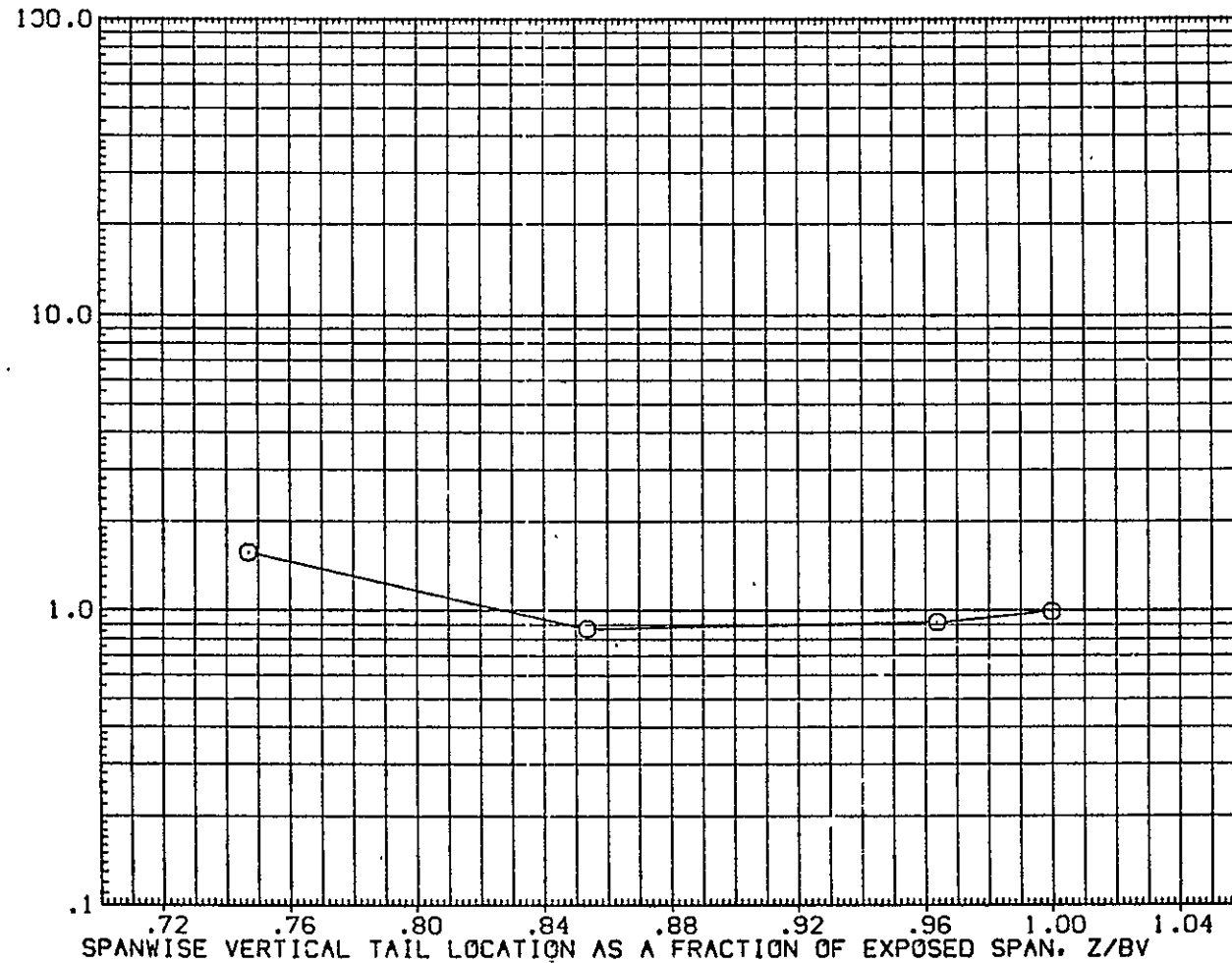


FIG. 10 EFFECT OF RECOVERY FACTOR ON THE ORBITER TAIL HEAT TRANSFER ALPHA = 0

0H12 + 1H21 MODEL 37 0T(05)/0(07) VERTICAL (IUGV05)

| | | | | | | |
|--------|--------|--------|-------|-------------------|------|-----------|
| SYMBOL | HAW/HT | GAGENO | MACH | PARAMETRIC VALUES | | |
| ○ | .900 | 40.000 | 7.610 | ALPHA | .000 | BETA .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, H_i/H_u

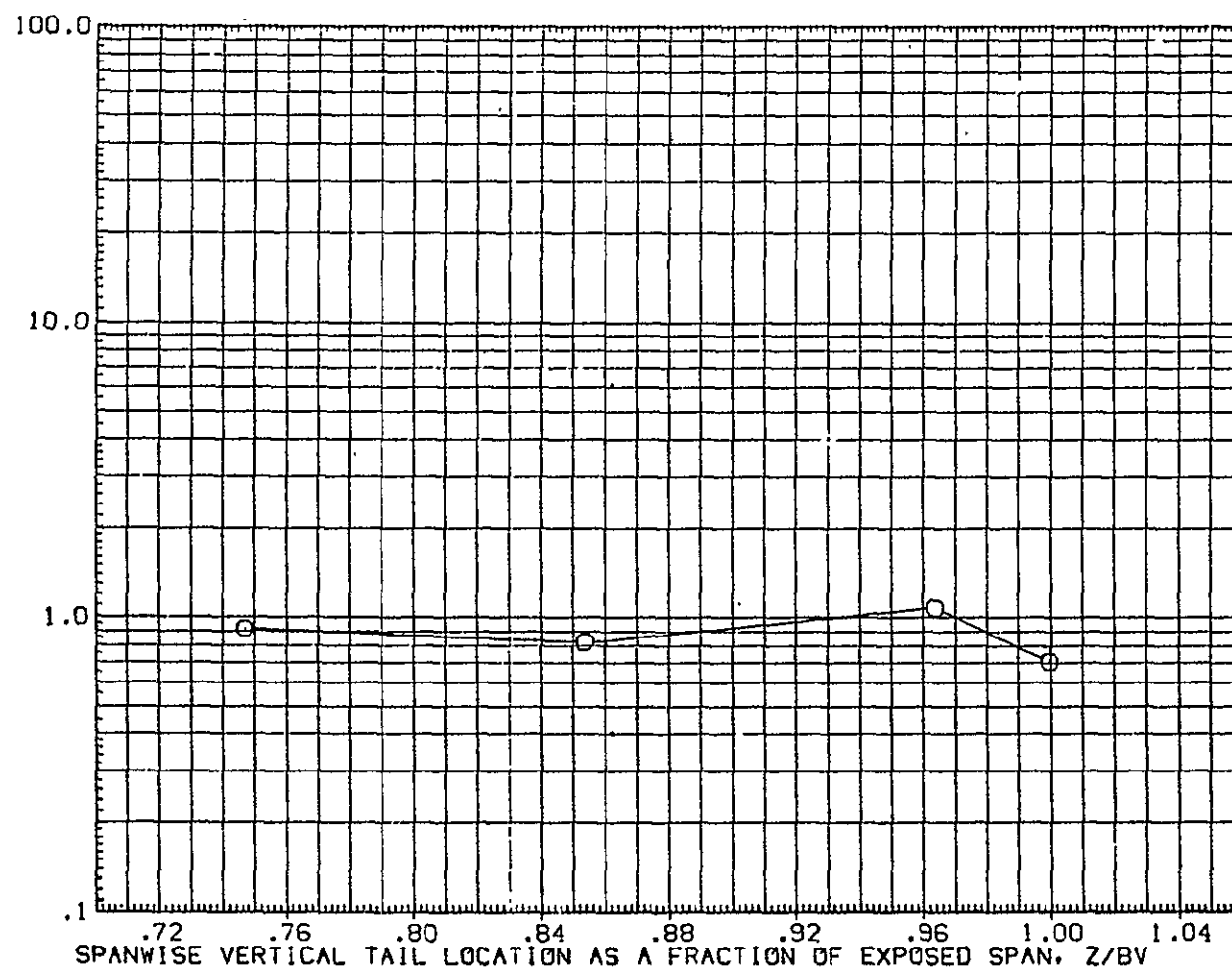


FIG. 10 EFFECT OF RECOVERY FACTOR ON THE ORBITER TAIL HEAT TRANSFER ALPHA = 0

0H12 + 1H21 MODEL 37 0T(05)/0(07) VERTICAL (1UGV05)

| | | | | | | |
|--------|--------|--------|--------|-------------------|------|-----------|
| SYMBOL | HAW/HT | GAGEND | MACH | PARAMETRIC VALUES | | |
| ○ | .900 | 40.000 | 18.300 | ALPHA | .000 | BETA .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, H_i/H_u

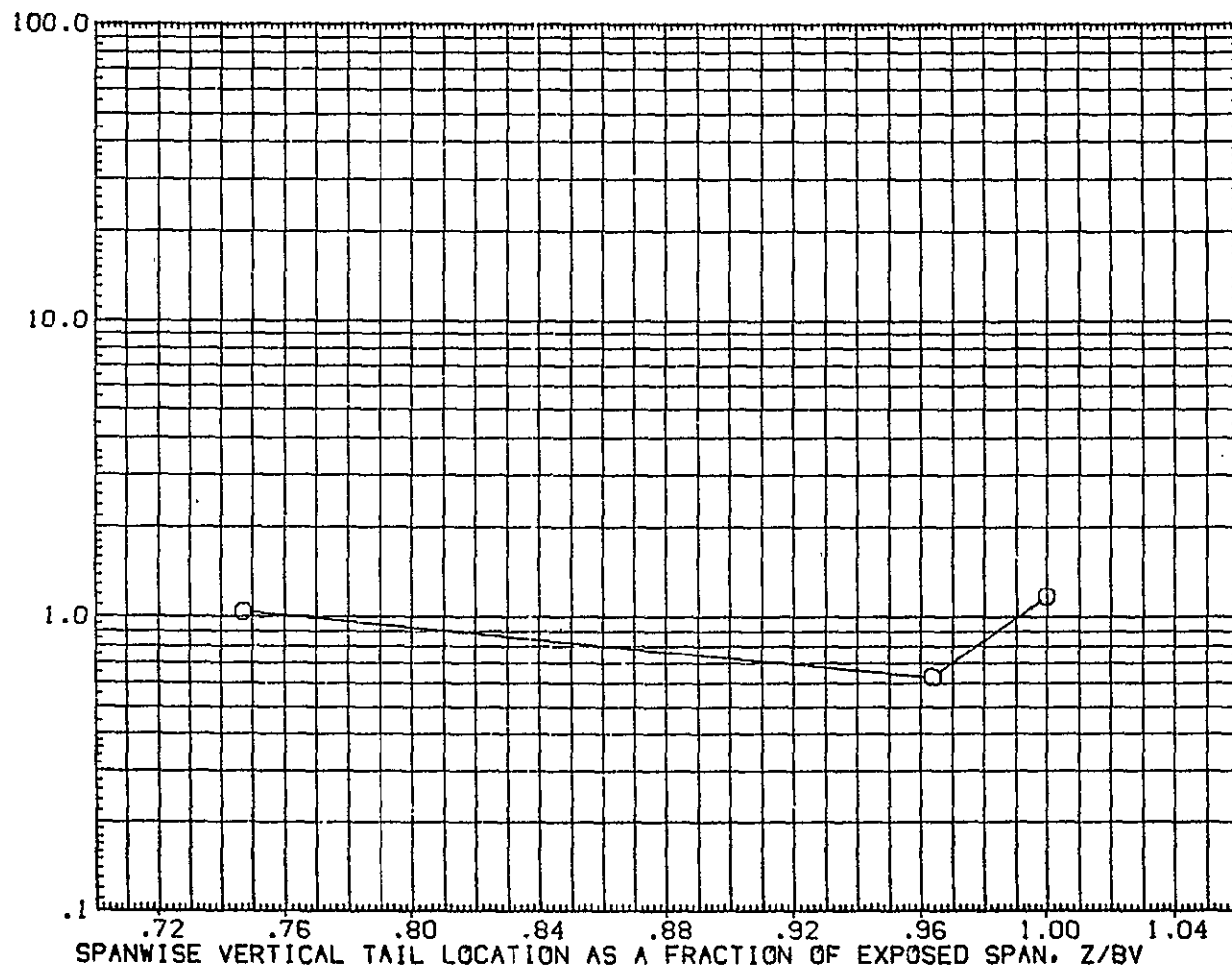


FIG. 10 EFFECT OF RECOVERY FACTOR ON THE ORBITER TAIL HEAT TRANSFER ALPHA = 0

OH12 + IH21 MODEL 37 OT(05)/O(07) VERTICAL (IUGV05)

SYMBOL
O
HAW/HT .900
GAGE NO 40.000
MACH 19.180

PARAMETRIC VALUES
ALPHA .000 BETA .000

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, H_i/H_u

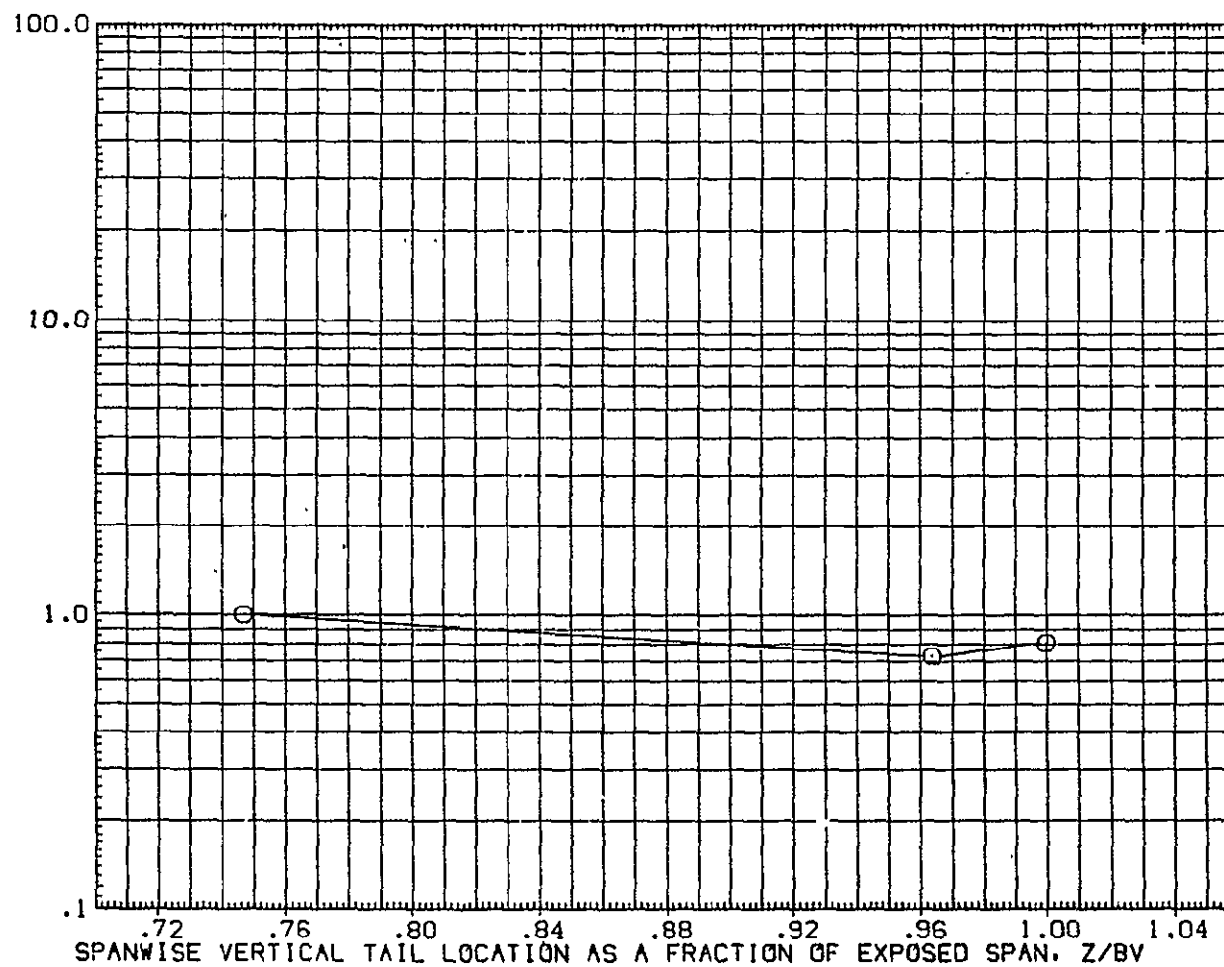
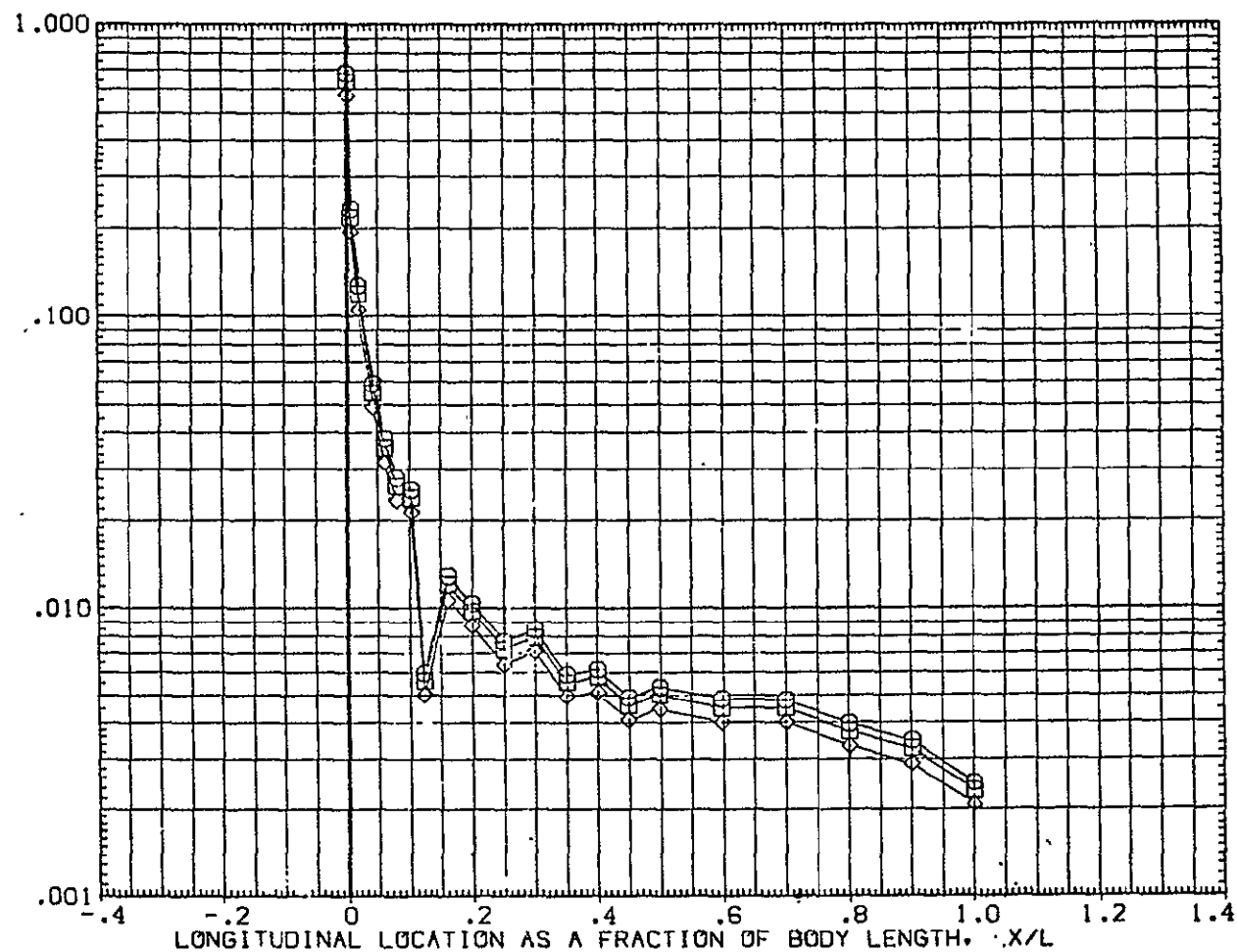


FIG. 10 EFFECT OF RECOVERY FACTOR ON THE ORBITER TAIL HEAT TRANSFER $\alpha = 0$

0H12/IH21 (CAL HST 173-100) 37 0

FUSELAGE (RUGB08)

| SYMBOL | HAW/HT | PHI | MACH | ALPHA | PARAMETRIC VALUES | BETA | |
|--------|--------|------|--------|-------|-------------------|------|------|
| ○ | .850 | .000 | 19.180 | | 5.000 | | .000 |
| □ | .900 | | | | | | |
| ◇ | 1.000 | | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF} FIG. 11 EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER $\alpha = 5$

OH12/IH21 (CAL HST 173-100) 37 0

FUSELAGE (RUGB08)

| SYMBOL | HAW/HT | PHI | MACH |
|--------|--------|--------|--------|
| ◇ | .850 | 25.000 | 19.180 |
| □ | .900 | | |
| ○ | 1.000 | | |

| PARAMETRIC VALUES | | |
|-------------------|------|------|
| ALPHA | BETA | |
| 5.000 | | .000 |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

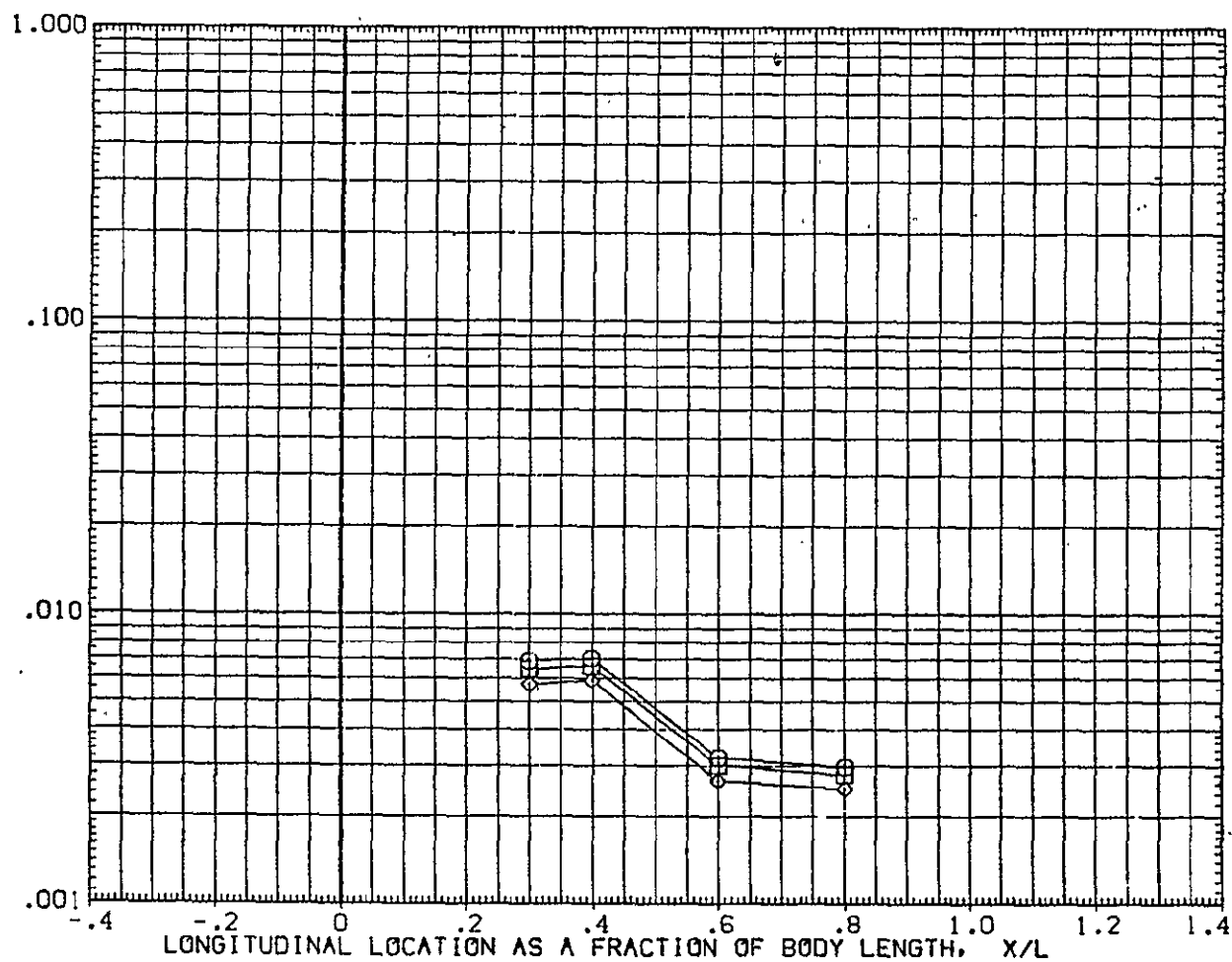
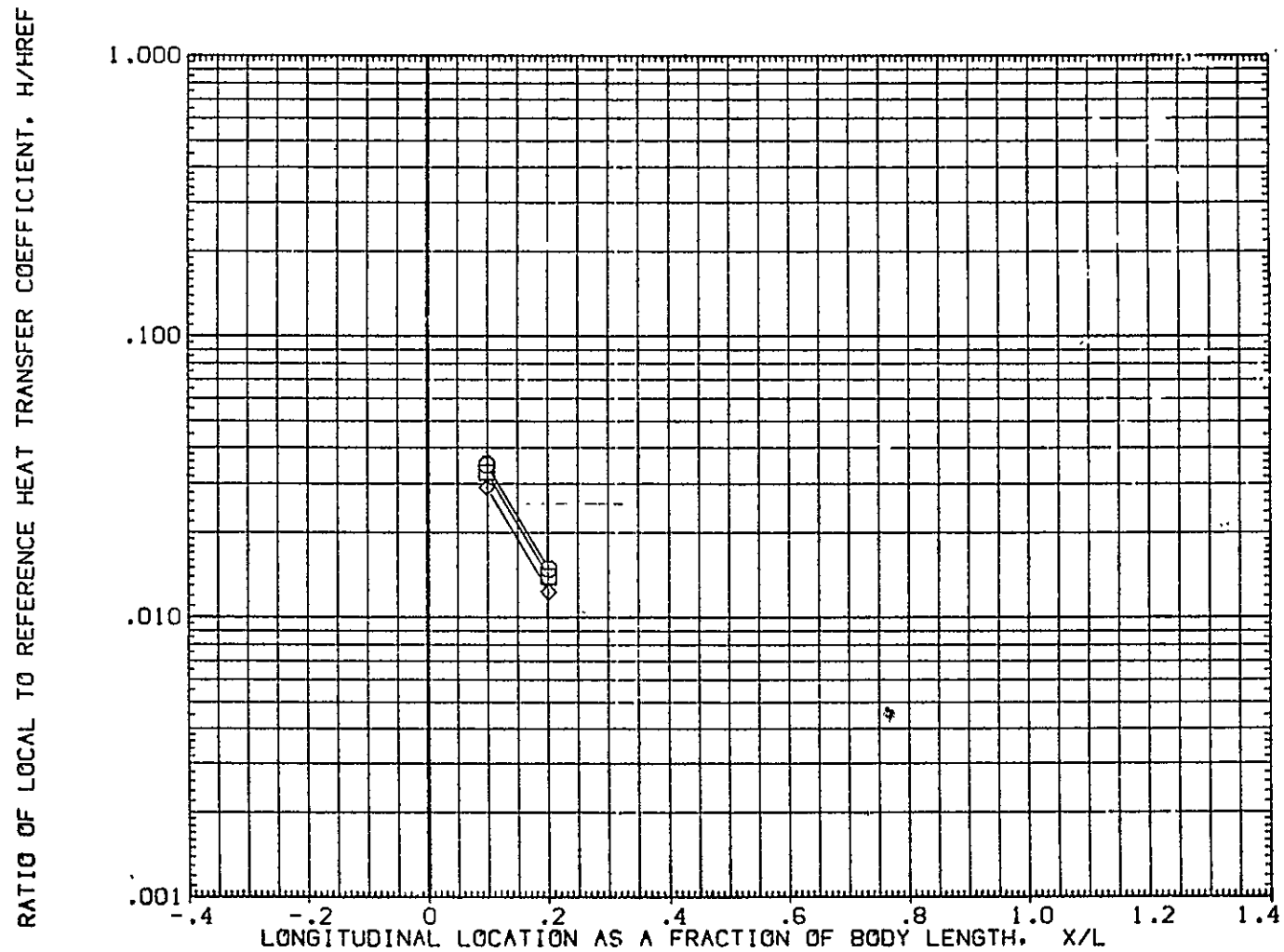


FIG. 11 EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER ALPHA = 5

0H12/IH21 (CAL HST 173-100) 37 0

FUSELAGE (RUGB08)

| SYMBOL | HAW/HT | PHI | MACH | ALPHA | PARAMETRIC VALUES | BETA | .000 |
|--------|--------|--------|--------|-------|-------------------|------|------|
| □ | .850 | 30.000 | 19.180 | | | | |
| ◇ | .900 | | | | | | |
| ◇ | 1.000 | | | | | | |

FIG. 11 EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER $\alpha = 5$

OH12/IH21 (CAL HST 173-100) 37 0

FUSELAGE (RUGB08)

| | | | | | | |
|--------|--------|---------|--------|-------|-------------------|------|
| SYMBOL | HAW/HT | PHI | MACH | ALPHA | PARAMETRIC VALUES | |
| ○ | .850 | 180.000 | 19.180 | 5.000 | BETA | .000 |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

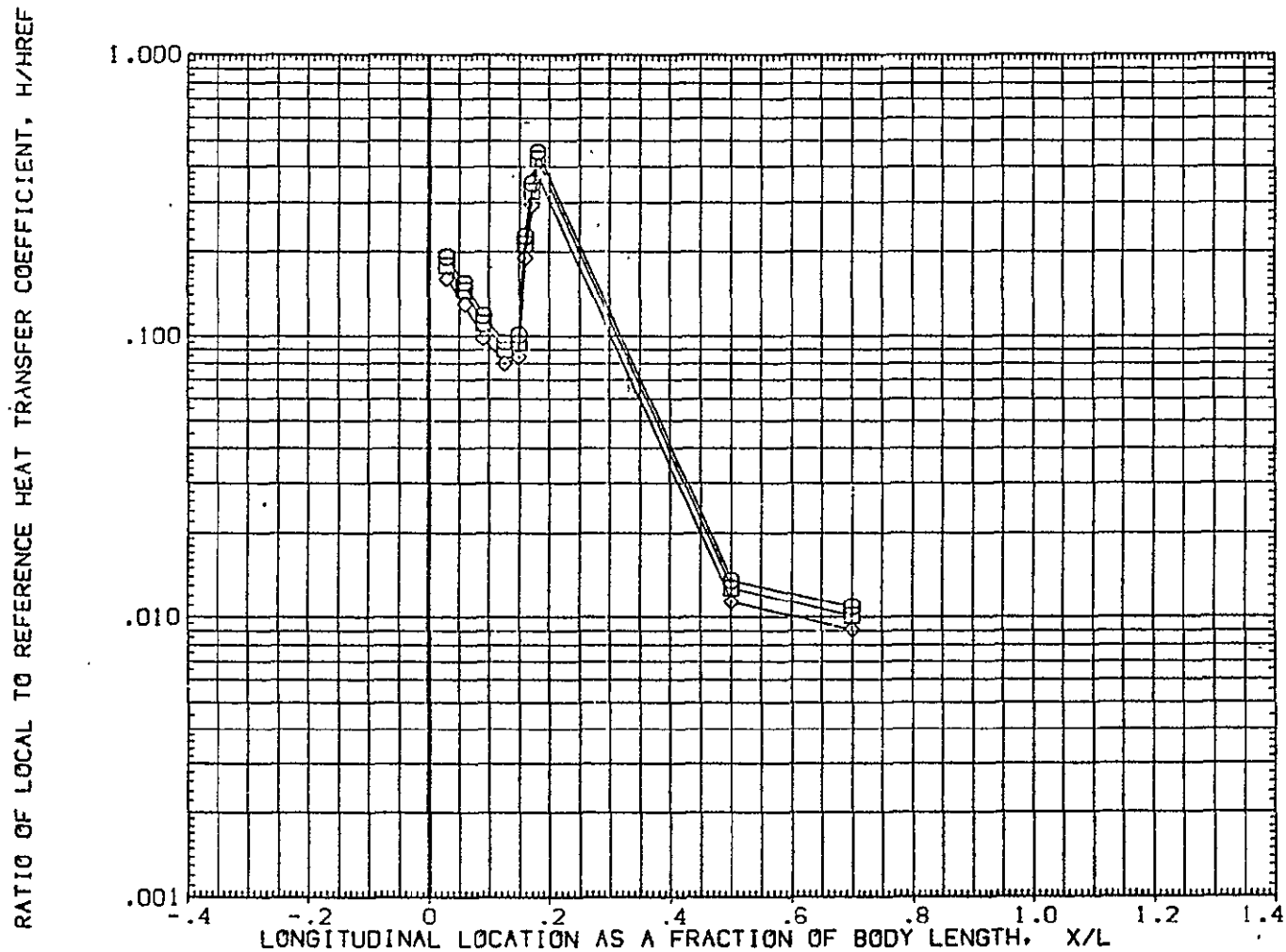


FIG. 11 EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER ALPHA = 5

0H12/IH21 (CAL HST 173-100) 37 0 T FUSELAGE (RUGB06)

| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES |
|--------|--------|------|--------|-----------------------|
| ◇ | .850 | .000 | 19.220 | ALPHA 5.000 BETA .000 |
| □ | .900 | | | |
| ○ | 1.000 | | | |

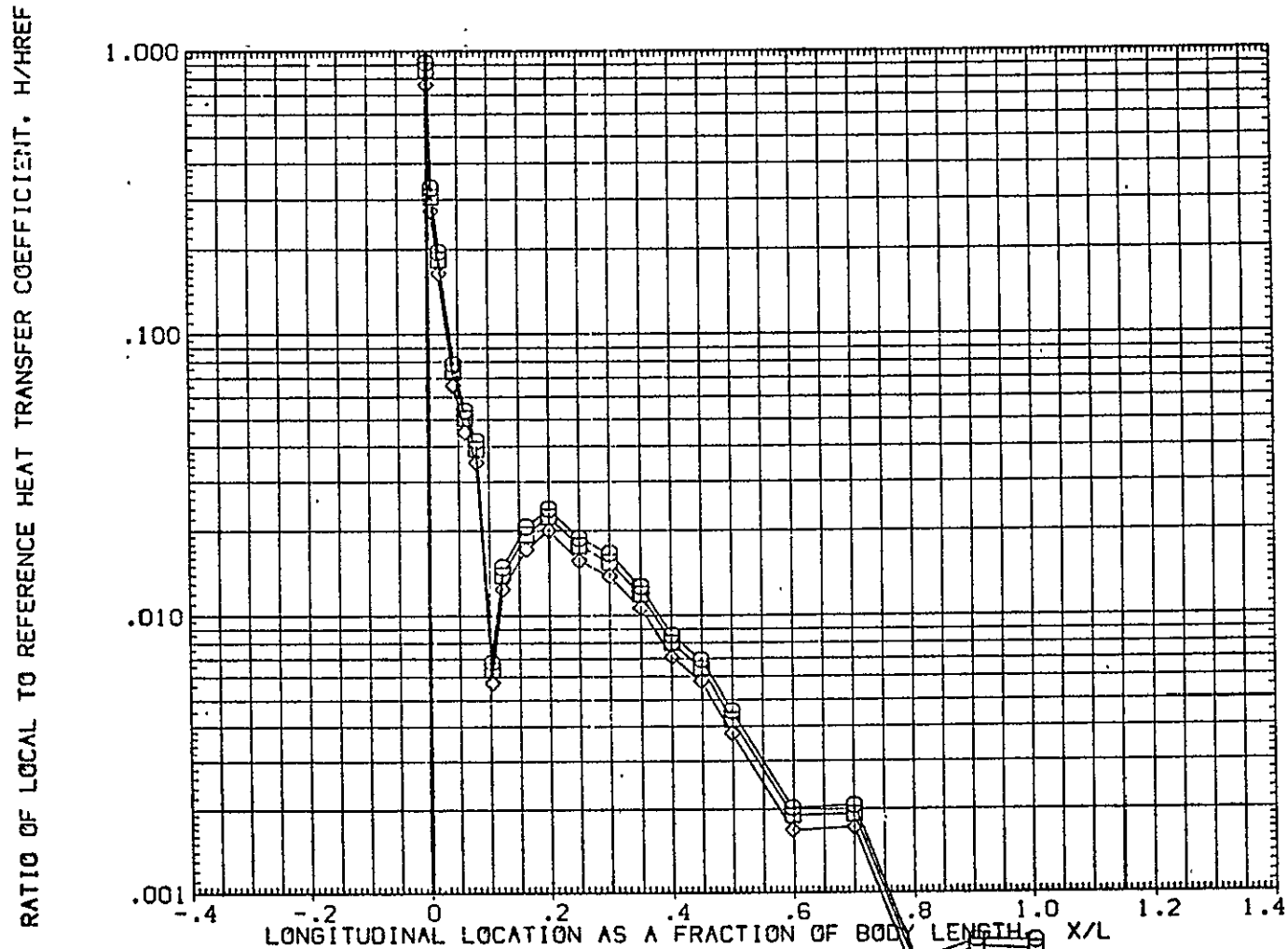


FIG. 11 EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER ALPHA = 5

5

OH12/IH21 (CAL HST 173-100) 37 0 T FUSELAGE (RUGB06)

| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES |
|--------|--------|--------|--------|-----------------------|
| ○ | .850 | 25.000 | 19.220 | ALPHA 5.000 BETA .000 |
| □ | .900 | | | |
| ◇ | 1.000 | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

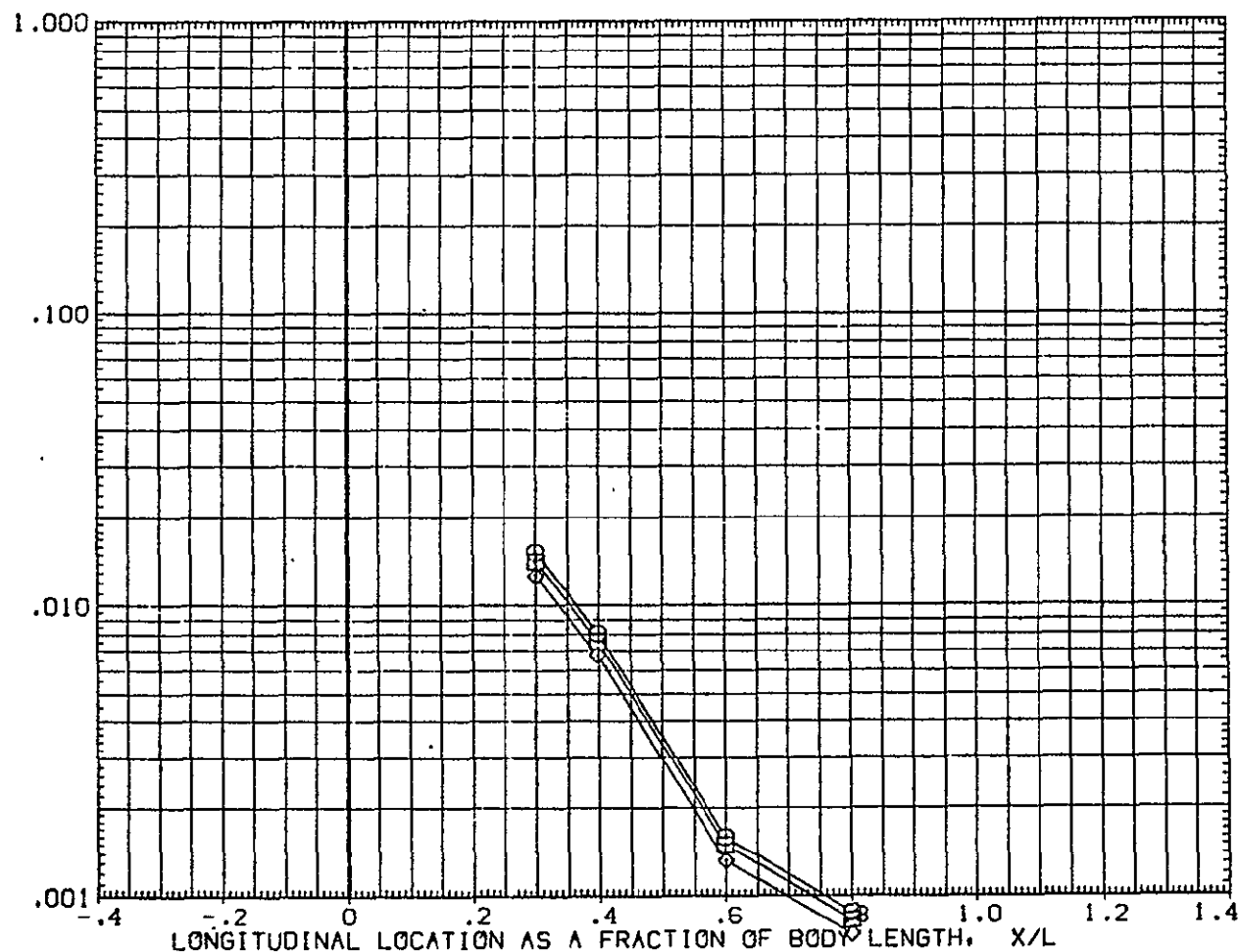


FIG. 11 EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER ALPHA = 5

0H12/IH21 (CAL HST 173-100) 37 0 T FUSELAGE (RUGB06)

| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
|--------|--------|--------|--------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| □ | .850 | 30.000 | 19.220 | 5.000 | | .000 |
| ◇ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

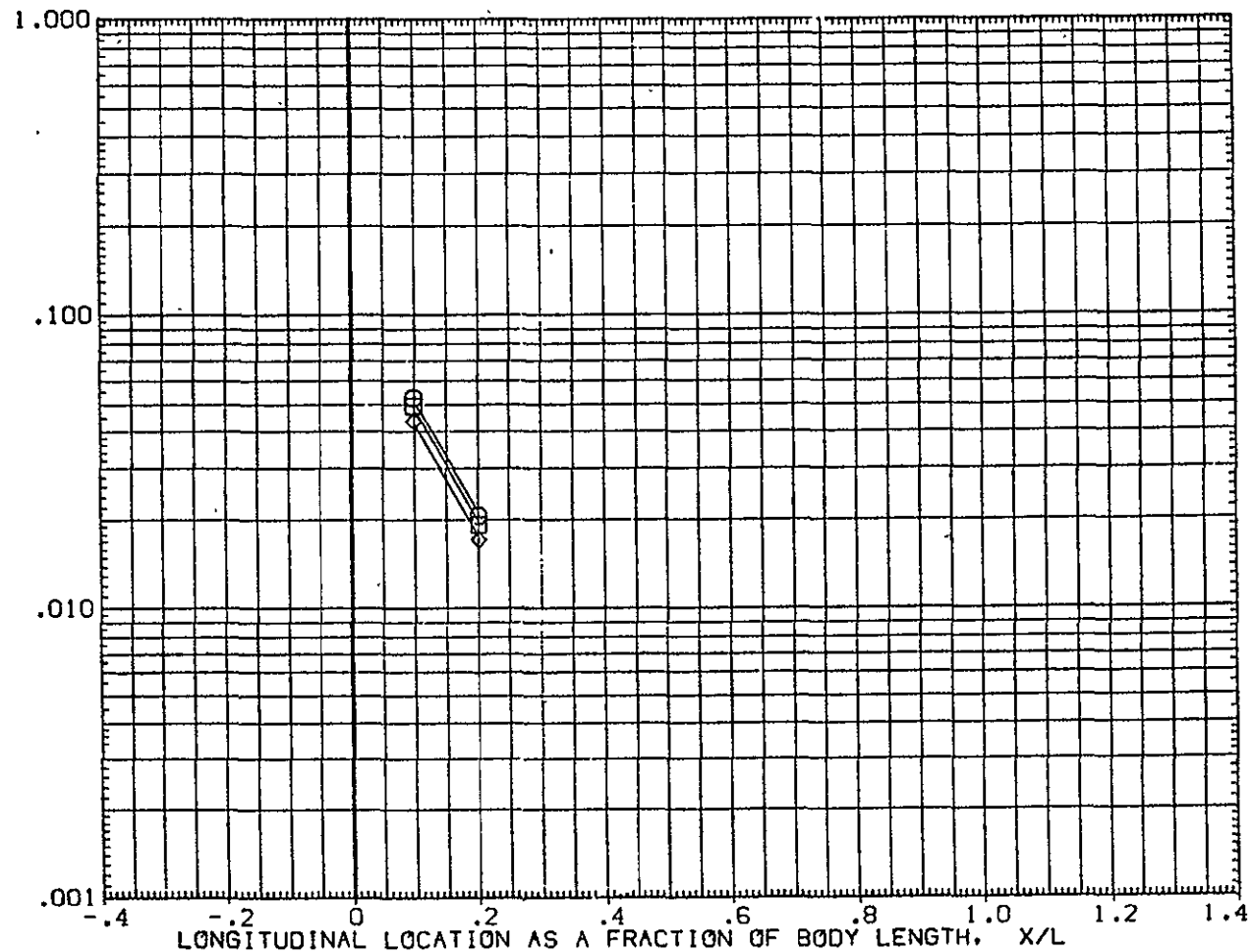


FIG. 11 EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER ALPHA = 5

OH12/IH21 (CAL HST 173-100) 37 0 T FUSELAGE (RUGB06)

| | | | | | | | |
|--------|--------|---------|--------|-------|-------------------|------|--|
| SYMBOL | HAW/HT | PHI | MACH | ALPHA | PARAMETRIC VALUES | BETA | |
| ○ | .850 | 180.000 | 19.220 | 5.000 | | .000 | |
| □ | .900 | | | | | | |
| ◇ | 1.000 | | | | | | |

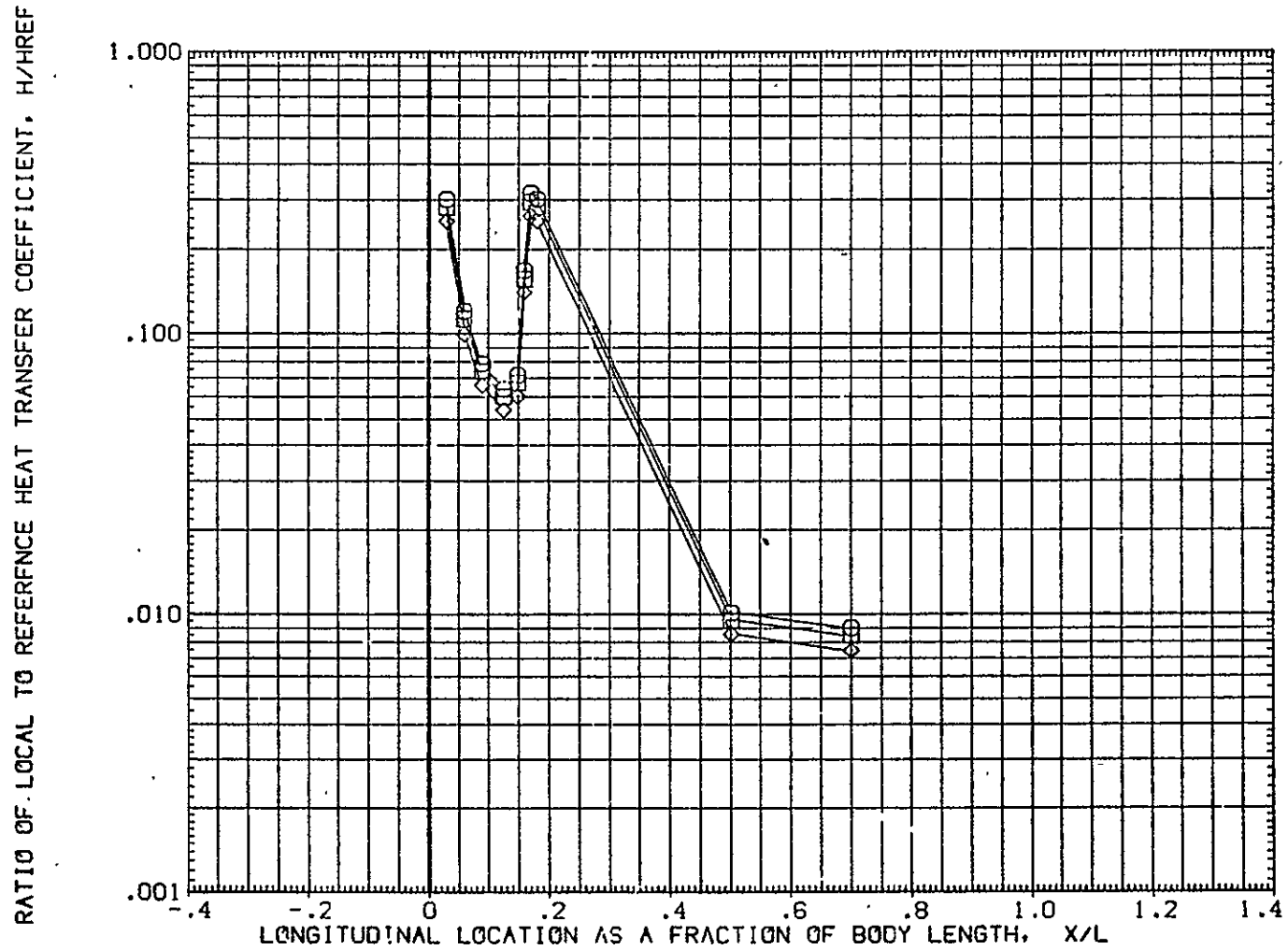


FIG. 11 EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER ALPHA = 5

OH12 + IH21 MODEL 37 OT(06)/O(08) FUSELAGE (IUG806)

| | | | | |
|--------|--------|------|--------|-----------------------|
| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES |
| O | .900 | .000 | 19.170 | ALPHA 5.000 BETA .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, H_i/H_u

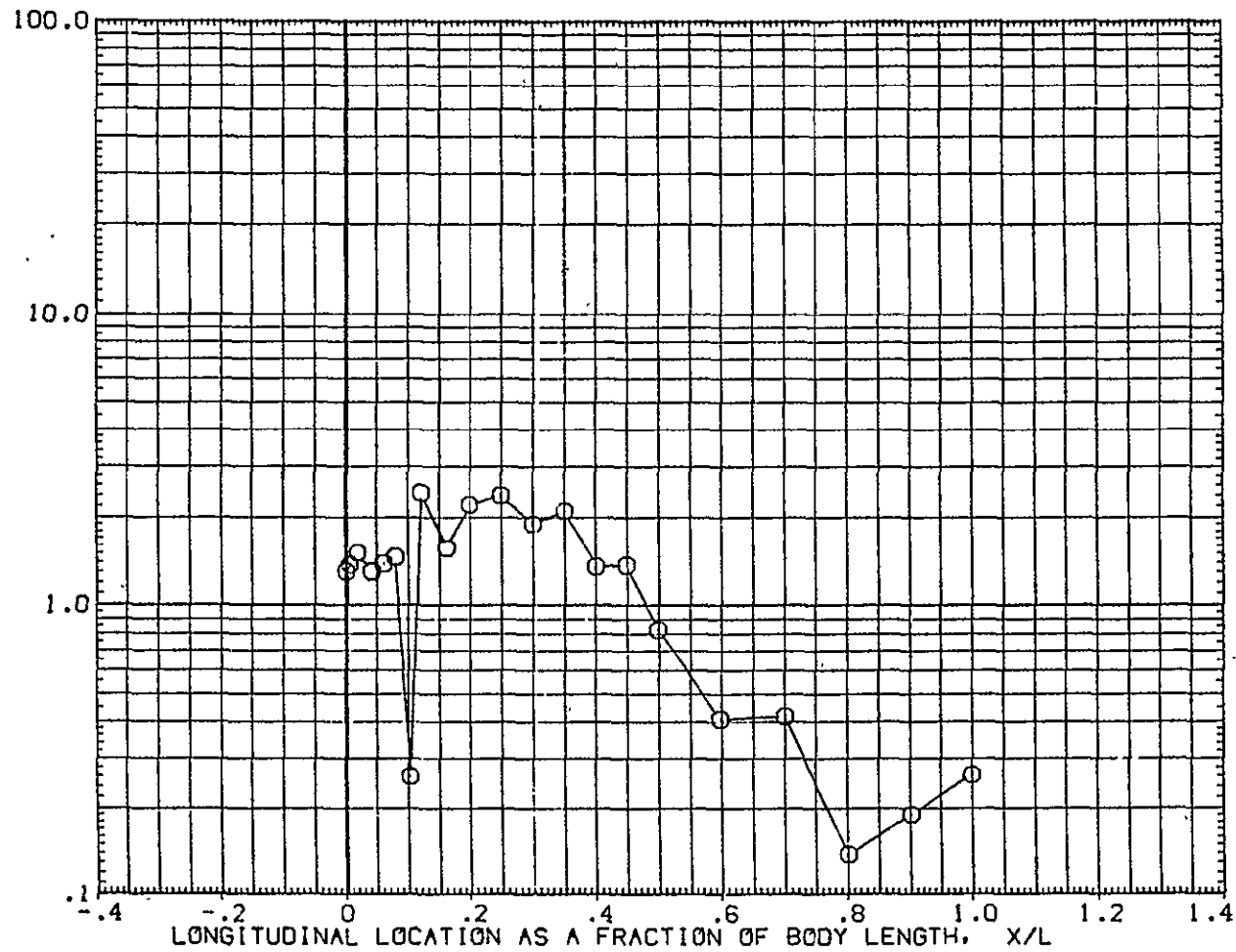


FIG. 11 EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER ALPHA = 5

OH12 + IH21 MODEL 37 OT(06)/O(08) FUSELAGE (IUGB06)

SYMBOL
O
HAW/HT .900
PHI 25.000
MACH 19.170

PARAMETRIC VALUES
ALPHA 5.000 BETA .000

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, H_i/H_u

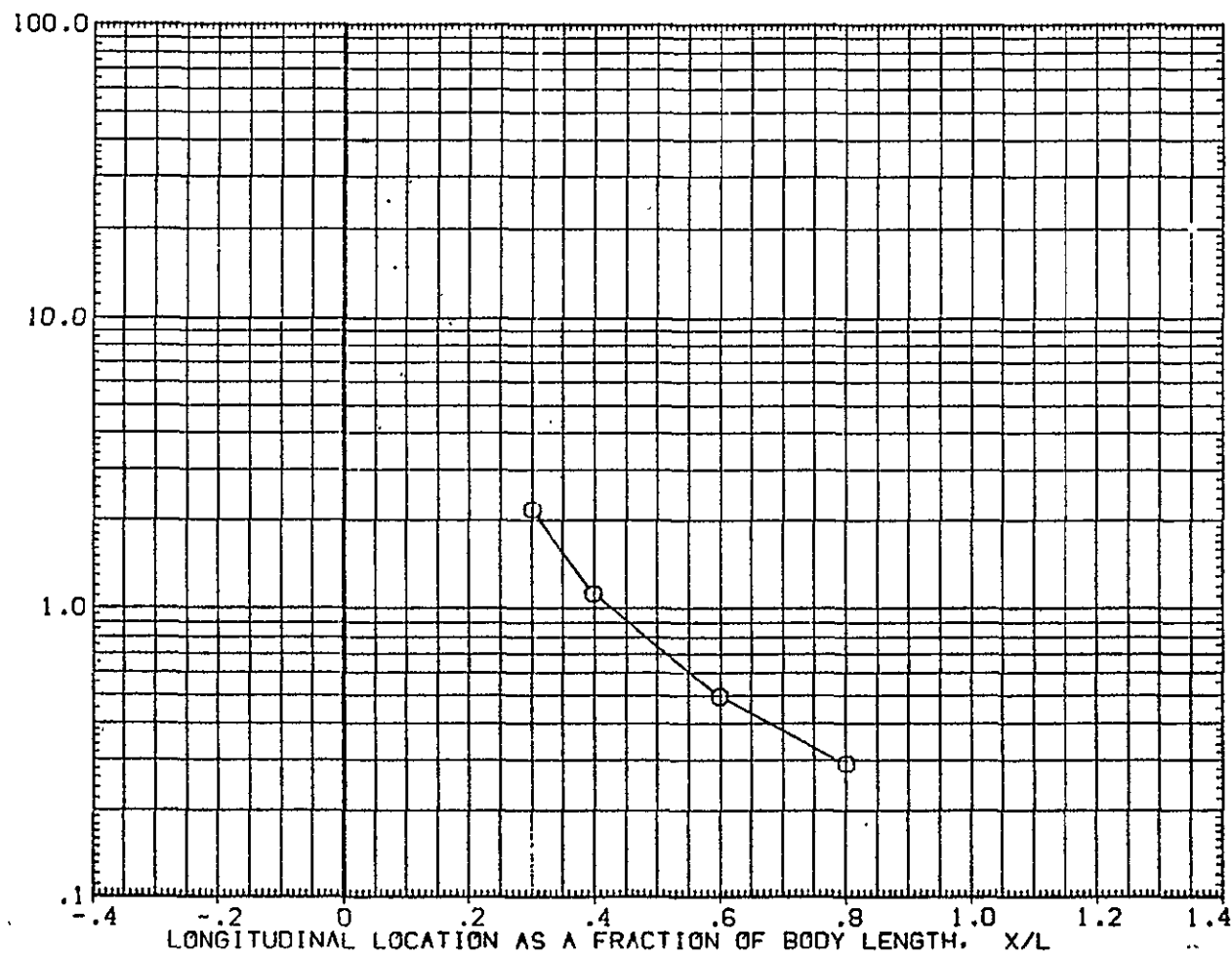


FIG. 11 EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER ALPHA = 5

OH12 + IH21 MODEL 37 OT(06)/O(08) FUSELAGE (IUGB06)

| | | | | |
|--------|--------|--------|--------|-----------------------|
| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES |
| O | .900 | 30.000 | 19.170 | ALPHA 5.000 BETA .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, H_i/H_u

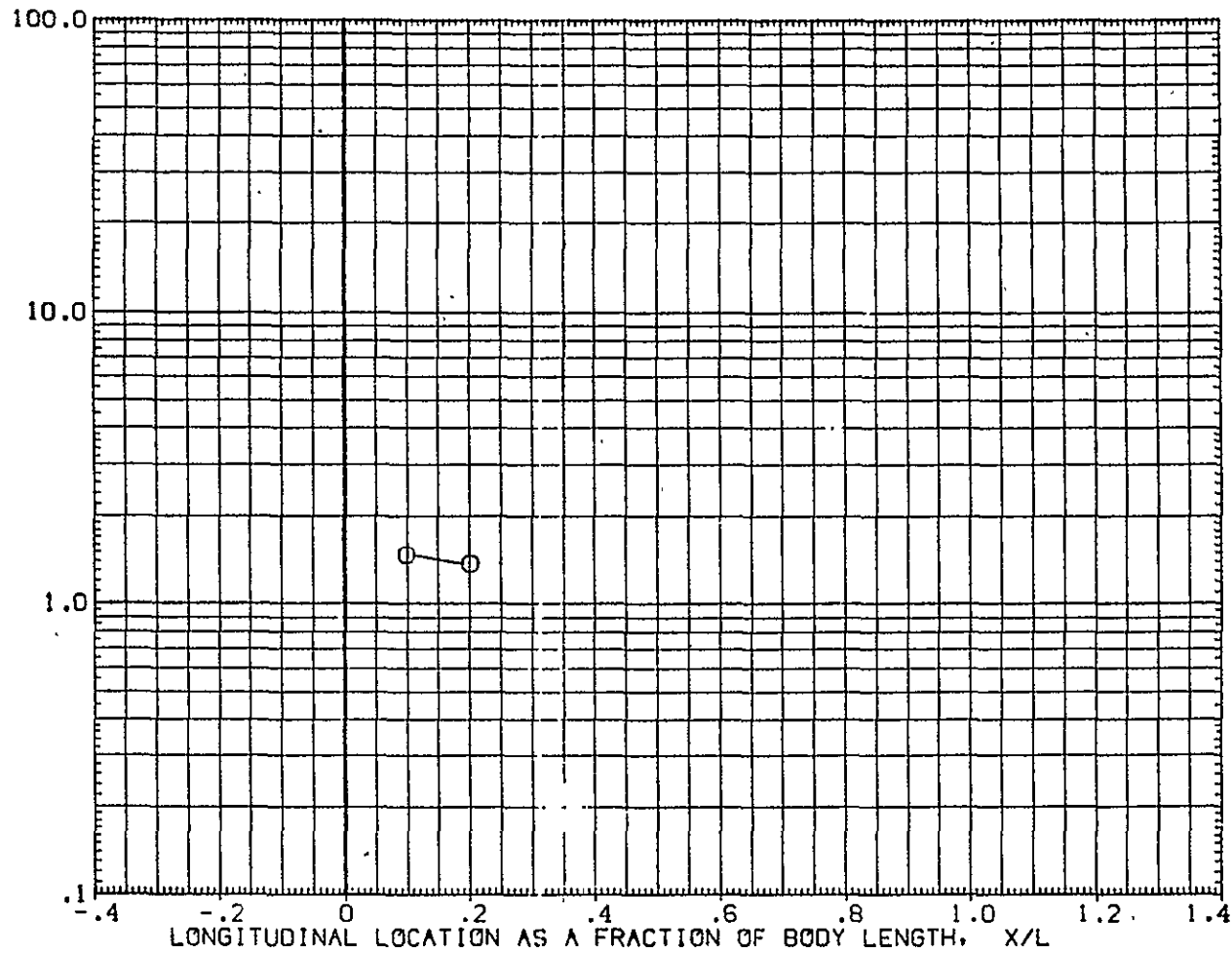


FIG. 11 EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER ALPHA = 5

OH12 + IH21 MODEL 37 OT(06)/O(08) FUSELAGE (IUGB06)

| | | | | | |
|--------|--------|---------|--------|-------|-------------------|
| SYMBOL | MAV/HT | PHI | MACH | | PARAMETRIC VALUES |
| ○ | .900 | 180.000 | 19.170 | ALPHA | 5.000 BETA .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, H_i/H_u

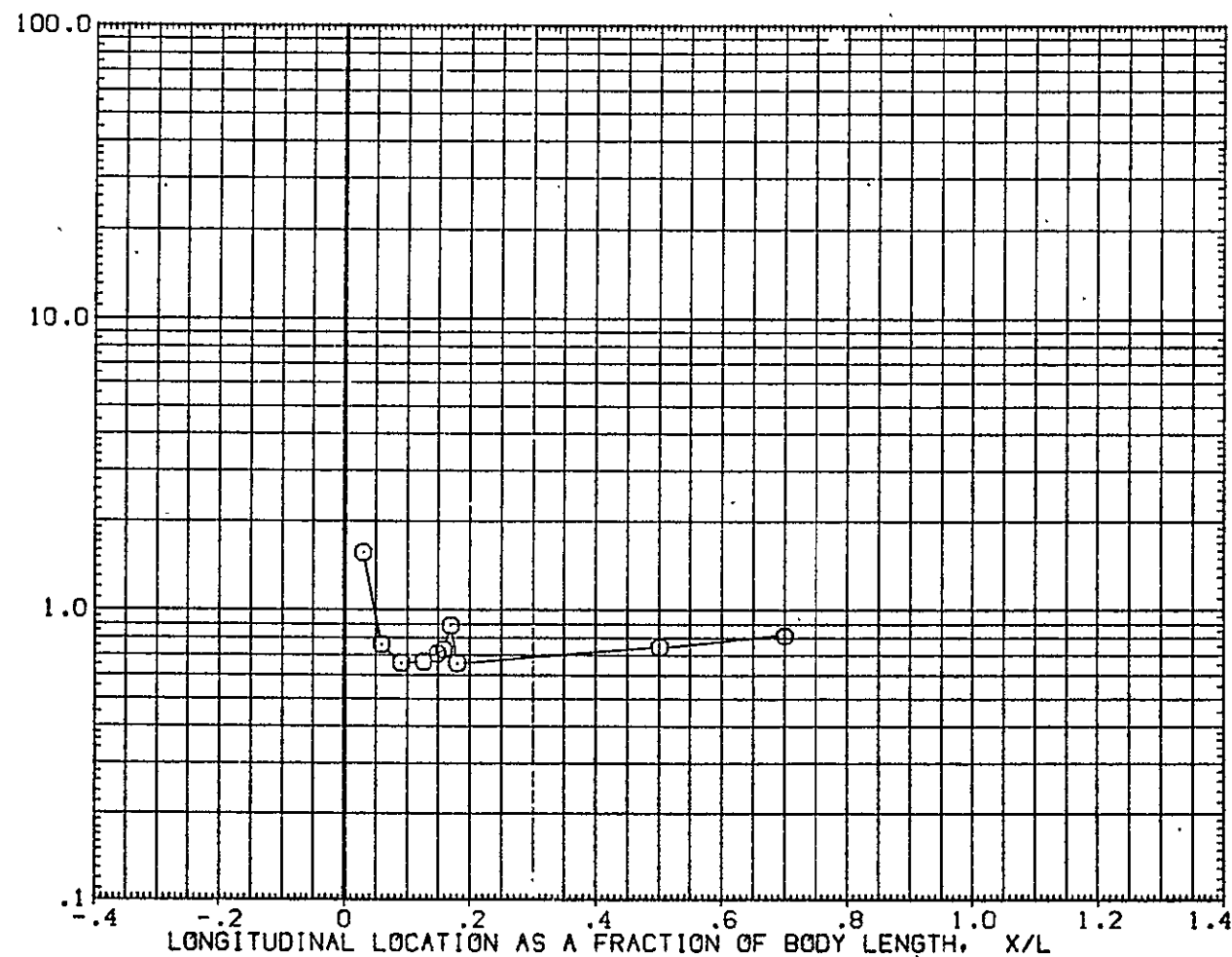


FIG. 11 EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER ALPHA = 5

OH12/IH21 (CAL HST 173-100) 37 0

WING L.S.(RUGW08)

| | | | | | | |
|--------|--------|------|--------|-------------------|-------|-----------|
| SYMBOL | HAW/HT | ZY/B | MACH | PARAMETRIC VALUES | | |
| □ | .850 | .250 | 19.180 | ALPHA | 5.000 | BETA .000 |
| ◇ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

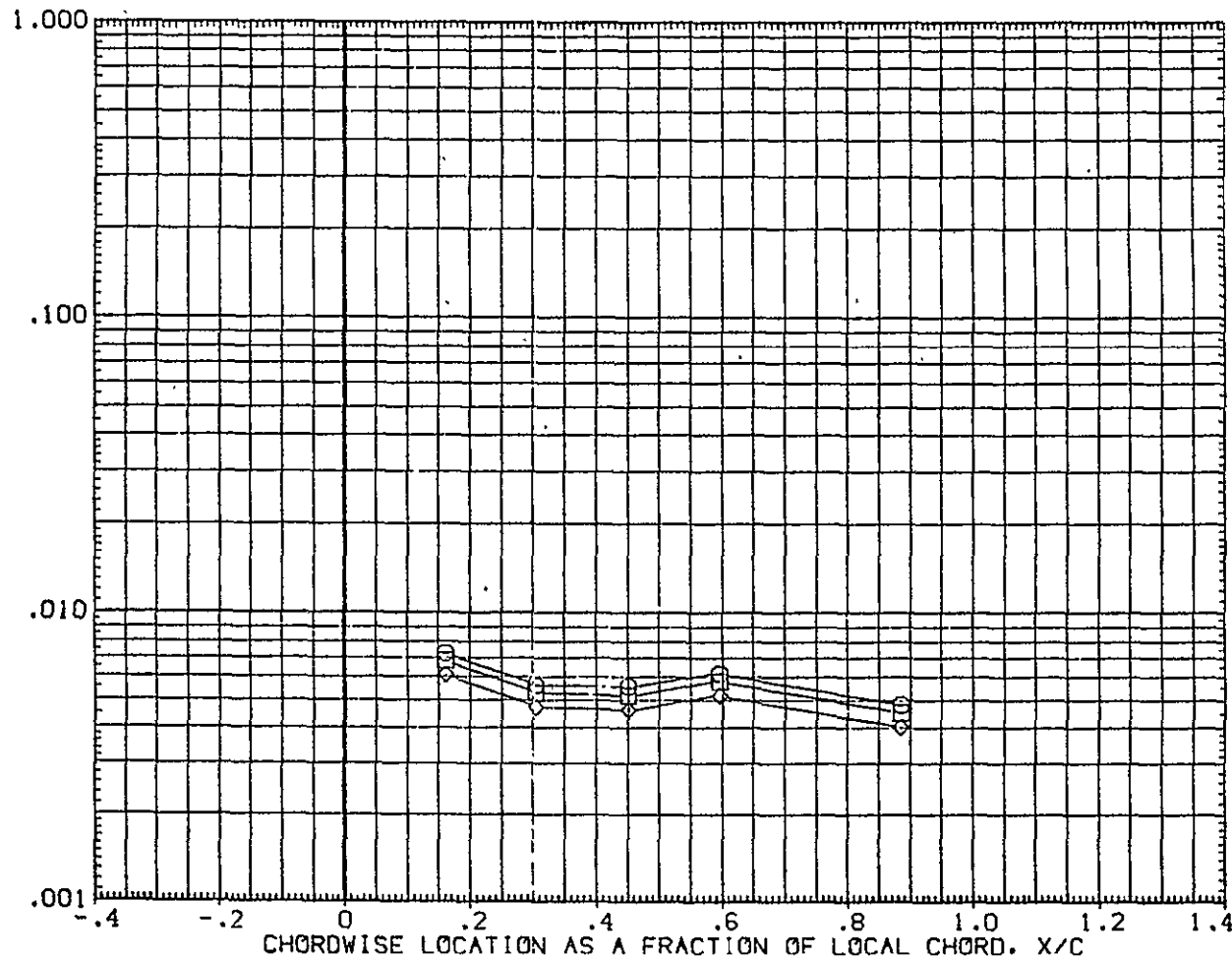


FIG. 12 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER ALPHA = 5

0H12/1H21 (CAL HST 173-100) 37 0

WING L.S.(RUGW08)

SYMBOL
 \diamond \square \circ

HAW/HT
 .850
 .900
 1.000

ZY/B
 .400

MACH
 19.180

PARAMETRIC VALUES
 ALPHA 5.000 BETA .000

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

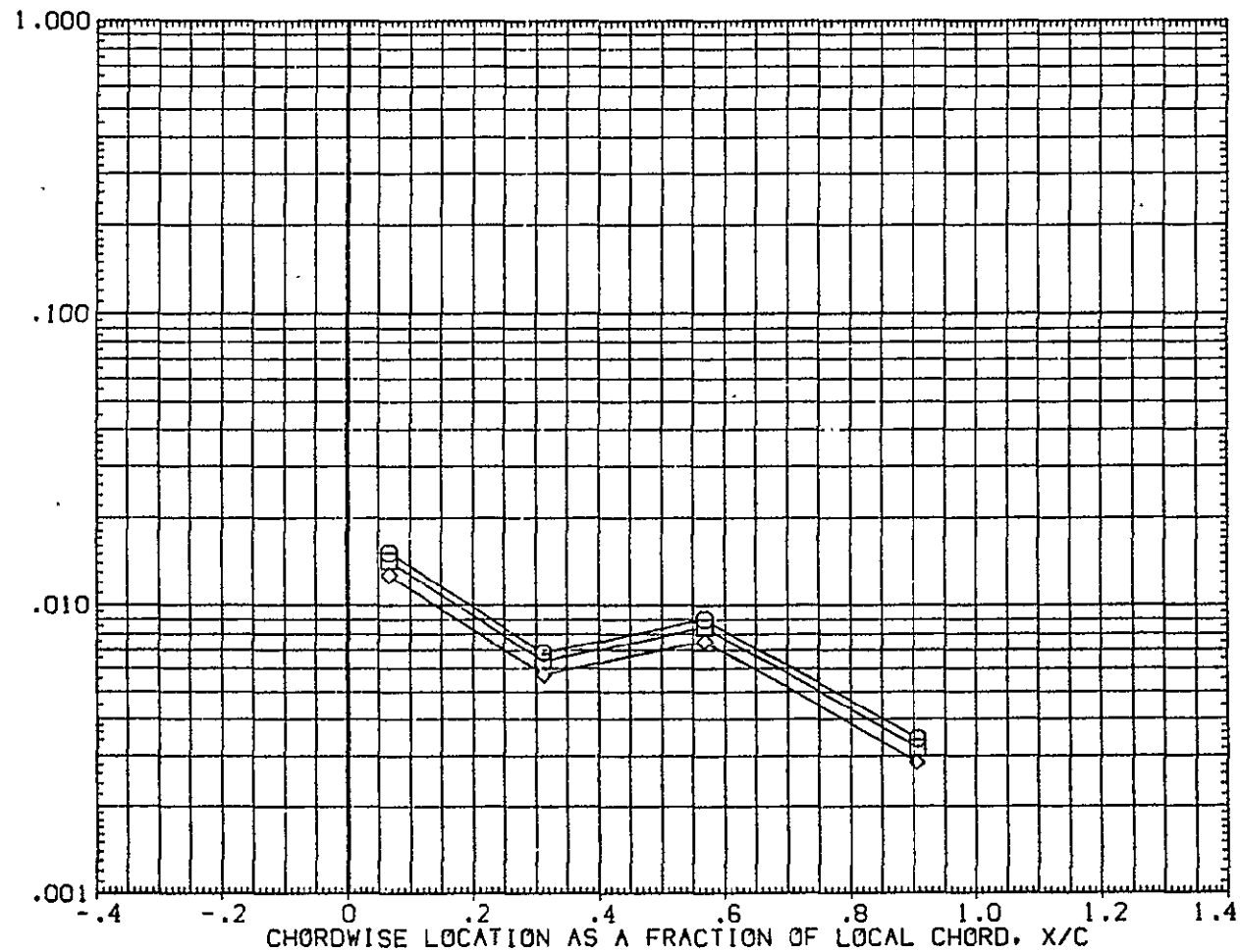
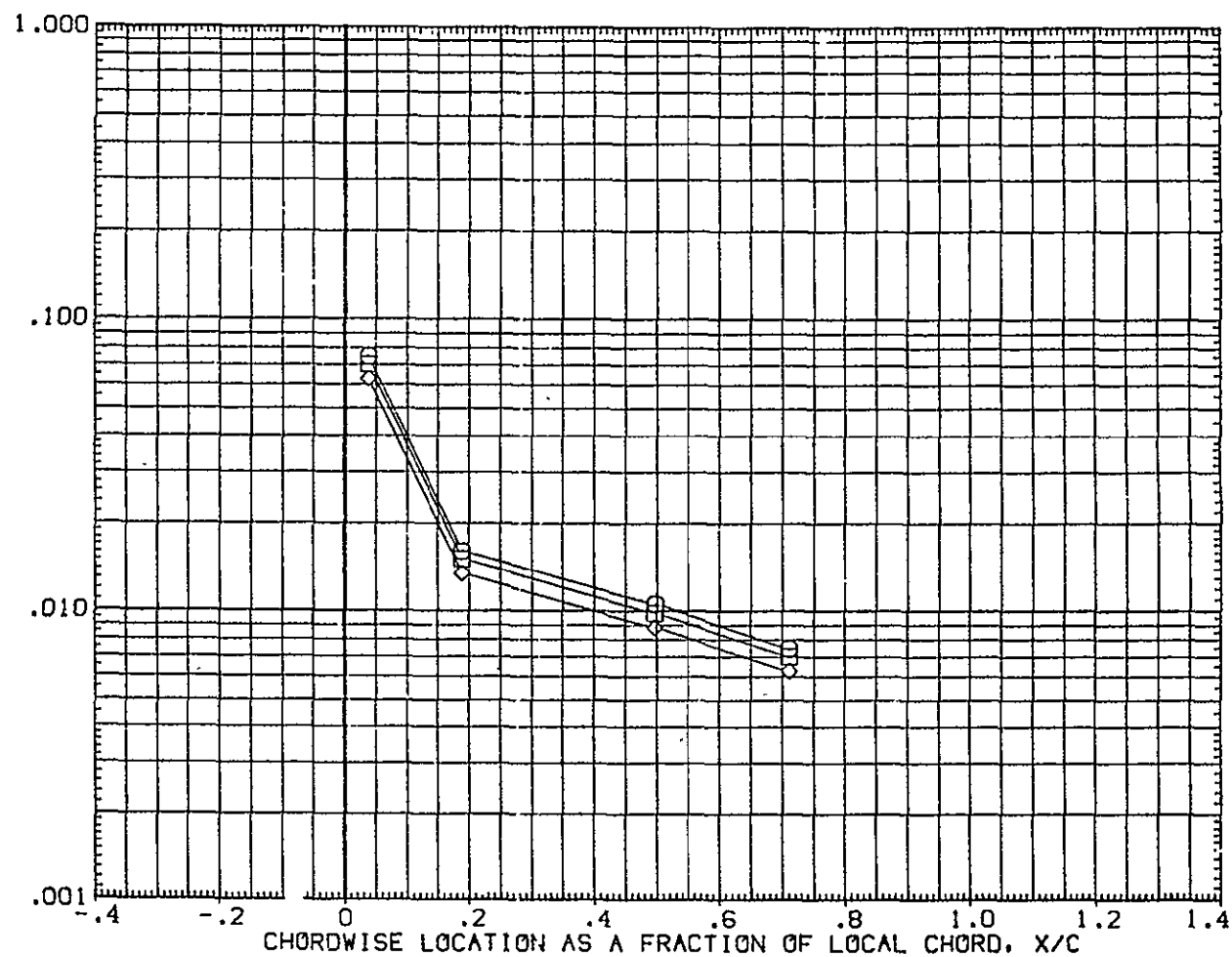


FIG. 12 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER ALPHA = 5

OH12/IH21 (CAL HST 173-100) 37 0

WING 'L.S.(RUGW08)

| SYMBOL | HAW/HT | 2Y/B | MACH | ALPHA | PARAMETRIC VALUES | |
|--------|--------|------|--------|-------|-------------------|------|
| ○ | .850 | .500 | 19.180 | 5.000 | BETA | .000 |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF} FIG. 12 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER $\alpha = 5$

CH12/IH21 (CAL HST 173-100) 37 0

WING L.S.(RUGW08)

SYMBOL
○
□
◇

HAW/HT
.850
.900
1.000

2Y/B
.600

MACH
19.180

ALPHA

PARAMETRIC VALUES
5.000 BETA

.000°

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

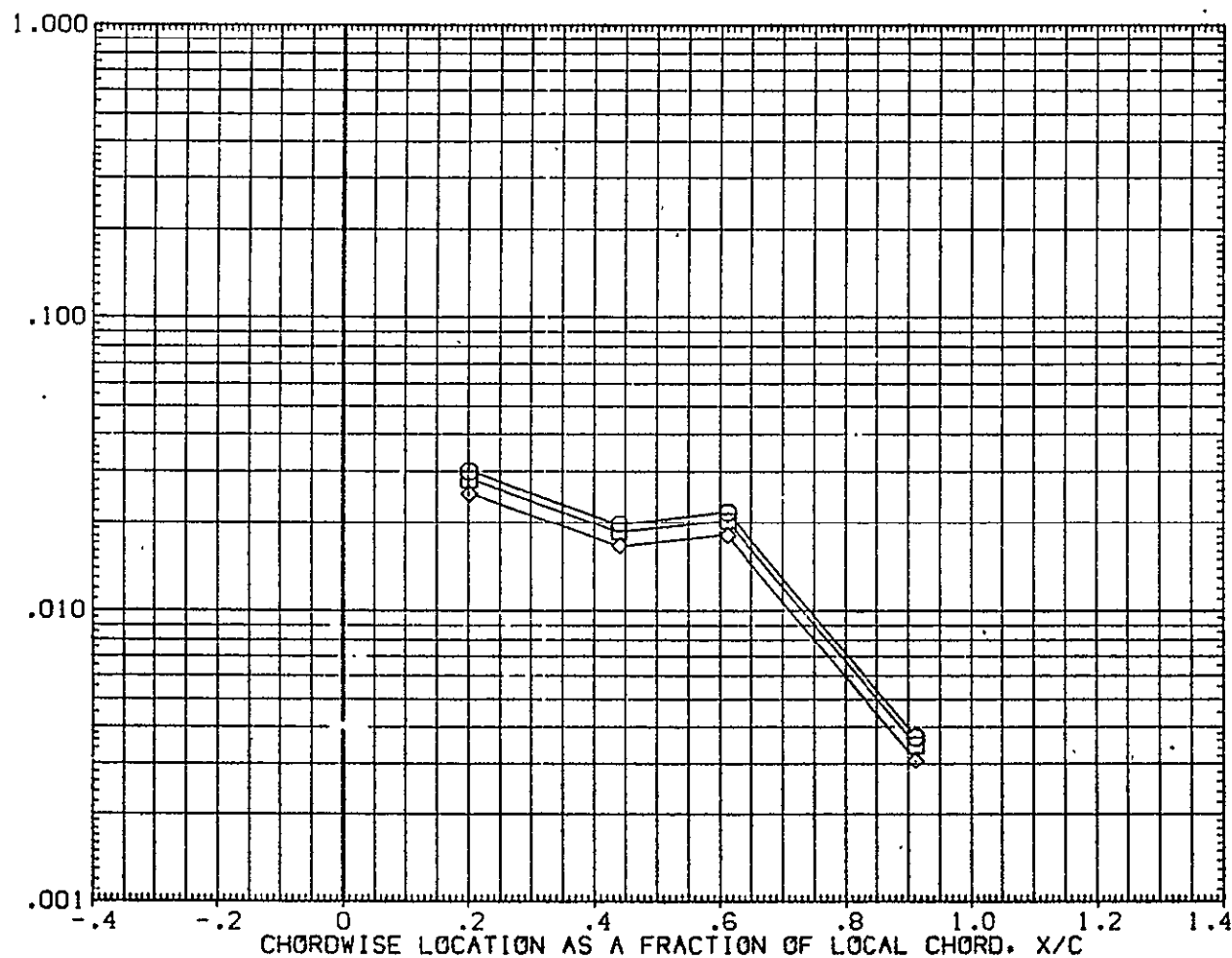


FIG. 12 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER ALPHA = 5

0H12/IH21 (CAL HST 173-100) 3' 0

WING L.S.(RUGW08)

| SYMBOL | HAW/HT | 2Y/B | MACH | PARAMETRIC VALUES | | |
|--------|--------|------|--------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| ○ | .850 | .750 | 19.180 | 5.000 | | .000 |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

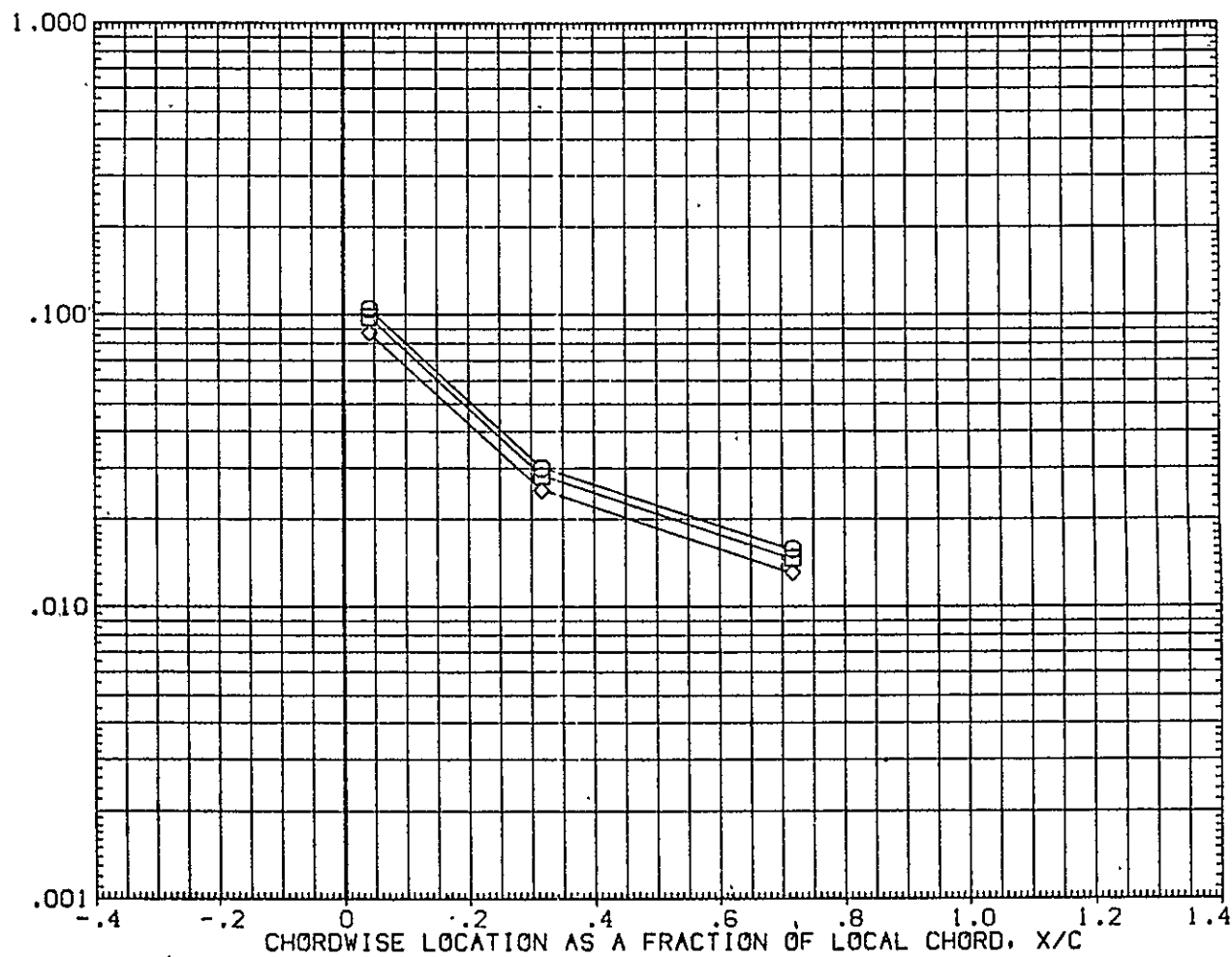
RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF} 

FIG. 12 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER ALPHA = 5

OH12/IH21 (CAL HST 173-100) 37 0

WING L.S.(RUGW08)

SYMBOL
 \square
 \square
 \diamond

HAW/HT
 .850
 .900
 1.000

2Y/B
 .950

MACH
 19.180

PARAMETRIC VALUES
 ALPHA 5.000 BETA .000

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

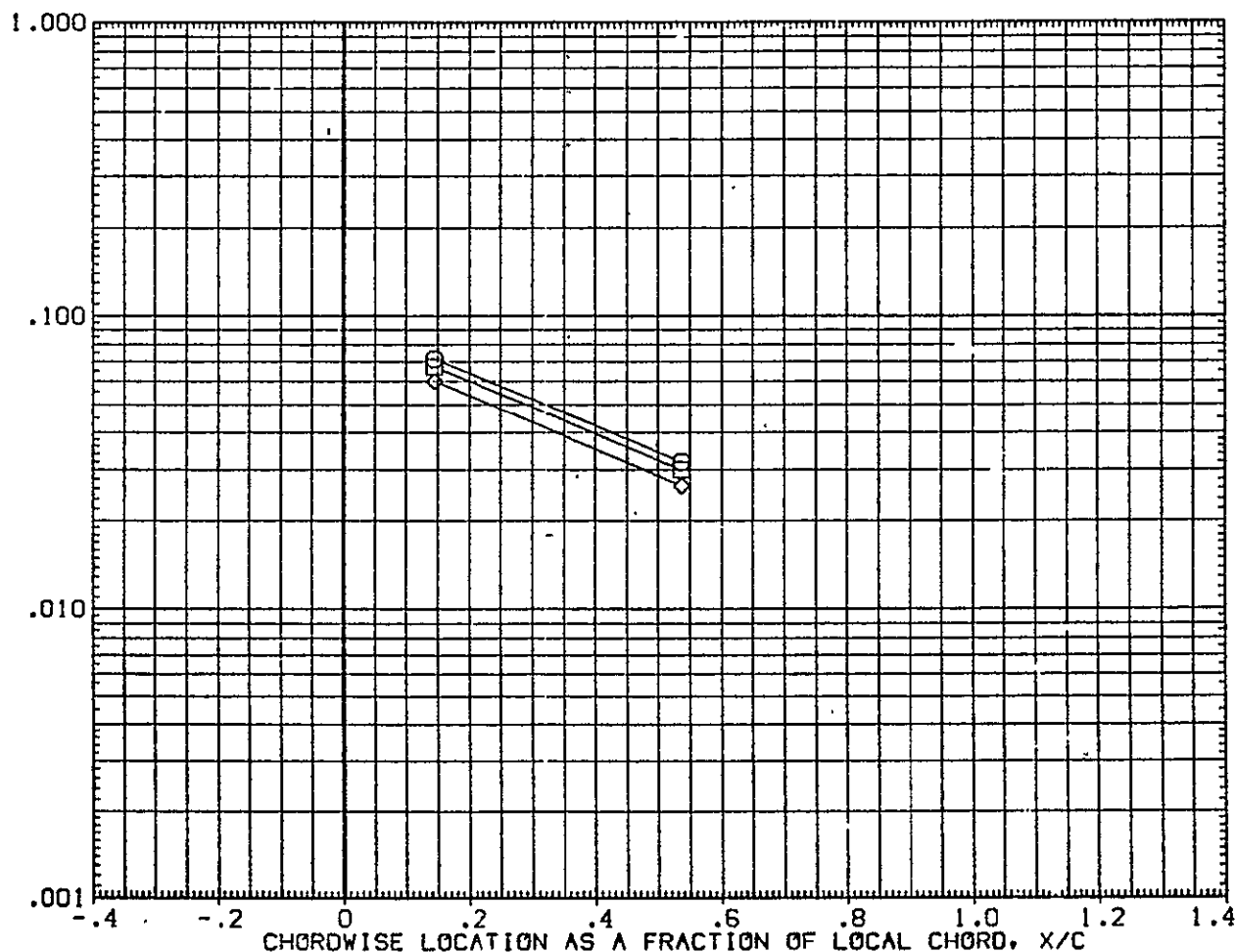


FIG. 12 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER ALPHA = 5

0H12/1H21 (CAL HST 173-100) 37 0 T WING L.S.(RUGW06)

| SYMBOL | HAW/HT | 2Y/B | MACH | PARAMETRIC VALUES | | |
|--------|--------|------|--------|-------------------|-------|-----------|
| ◇ | .850 | .250 | 19.220 | ALPHA | 5.000 | BETA .000 |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

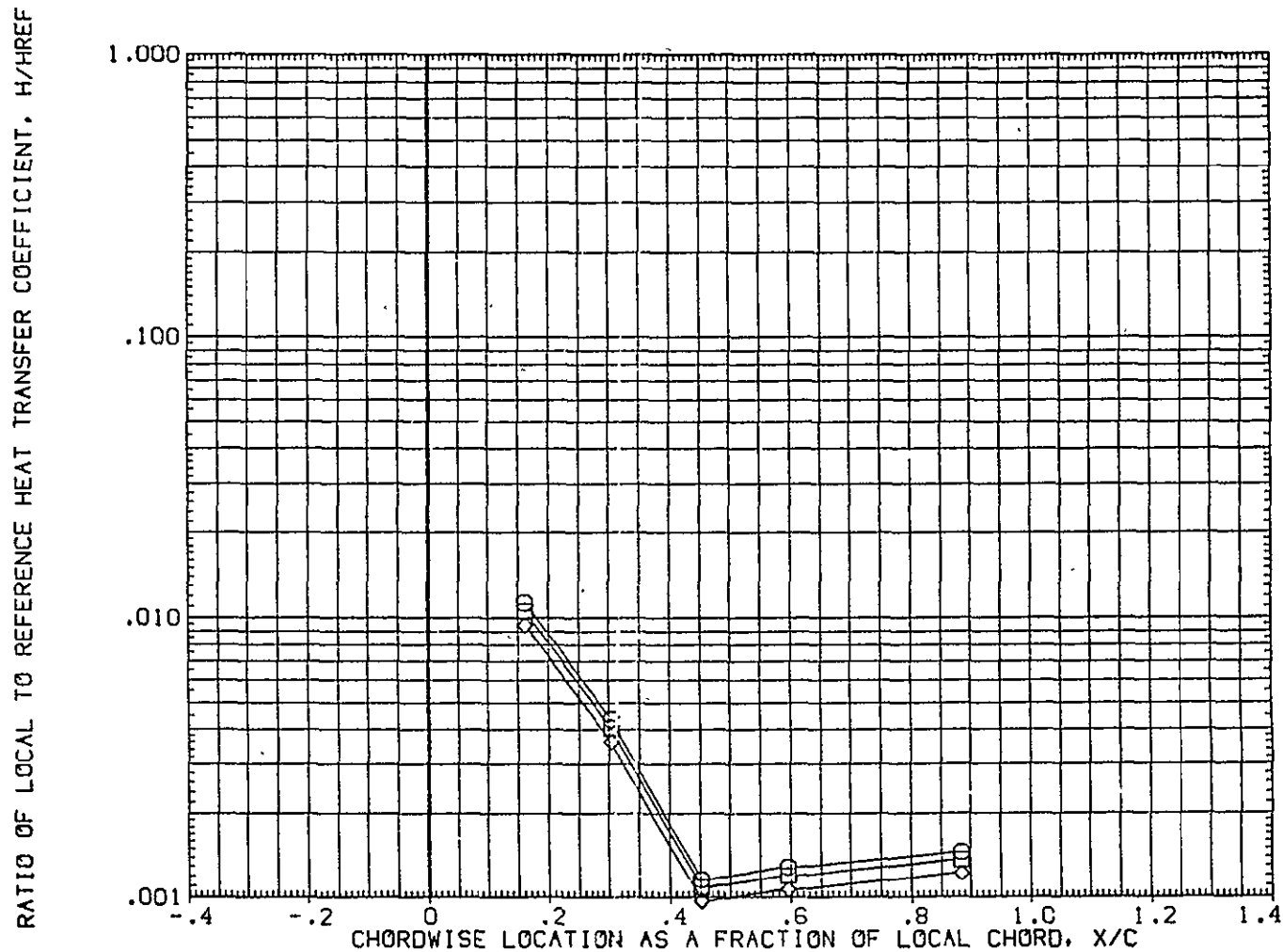


FIG. 12 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER $\alpha = 5$

REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR

0H12/1H21 (CAL HST 173-100) 37 0 T WING L.S. (RUGW06)

| | | | | | | |
|--------|--------|------|--------|-------------------|-------|------|
| SYMBOL | HAW/HT | 2Y/B | MACH | PARAMETRIC VALUES | | |
| ○ | .850 | .400 | 19.220 | ALPHA | 5.000 | BETA |
| □ | .900 | | | | | .000 |
| ◇ | 1.000 | | | | | |

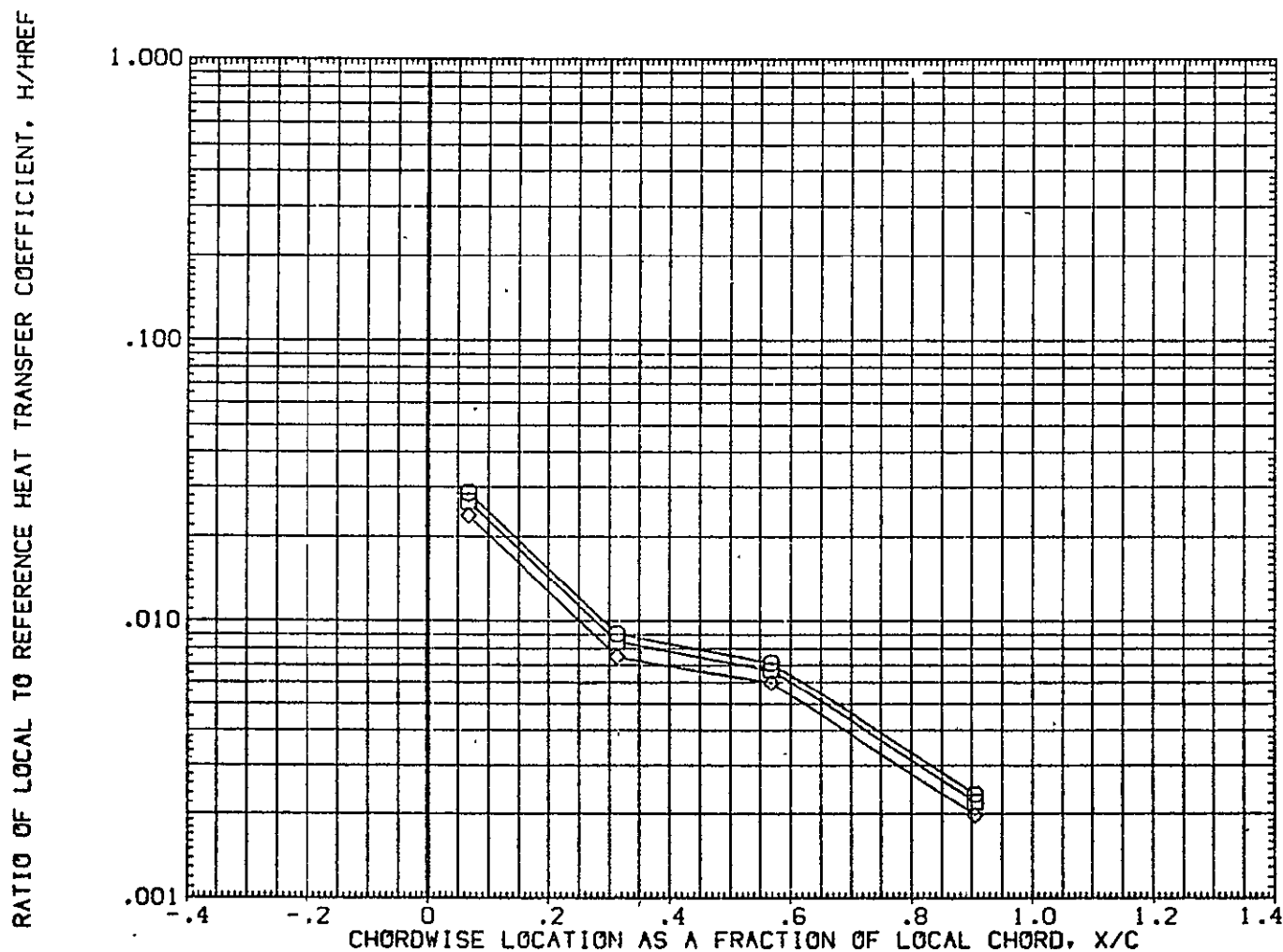


FIG. 12 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER ALPHA = 5

0H12/IH21 (CAL HST 173-100) 37 0 T WING L.S.(RUGW06)

| SYMBOL | HAW/HT | 2Y/B | MACH | PARAMETRIC VALUES | | |
|--------|--------|------|--------|-------------------|------|--|
| | | | | ALPHA | BETA | |
| ○ | .850 | .500 | 19.220 | 5.000 | | |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

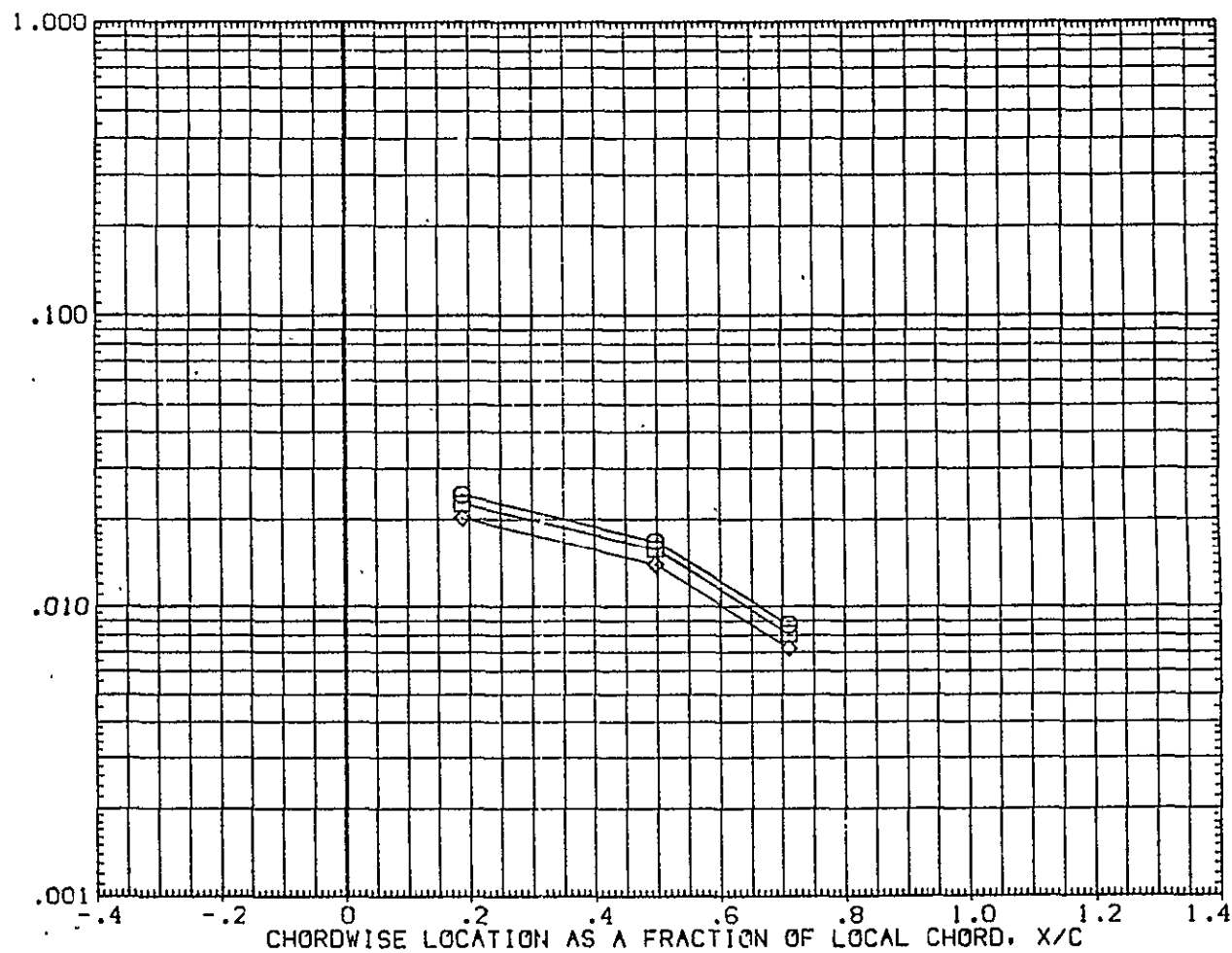


FIG. 12 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER ALPHA = 5

0H12/1H21 (CAL HST 173-100) 37 0 T WING L.S.(RUGW06)

| | | | | |
|--------|--------|------|--------|-----------------------|
| SYMBOL | HAW/HT | 2Y/B | MACH | PARAMETRIC VALUES |
| □ | .850 | .600 | 19.220 | ALPHA 5.000 BETA .000 |
| ◇ | .900 | | | |
| ◇ | 1.000 | | | |

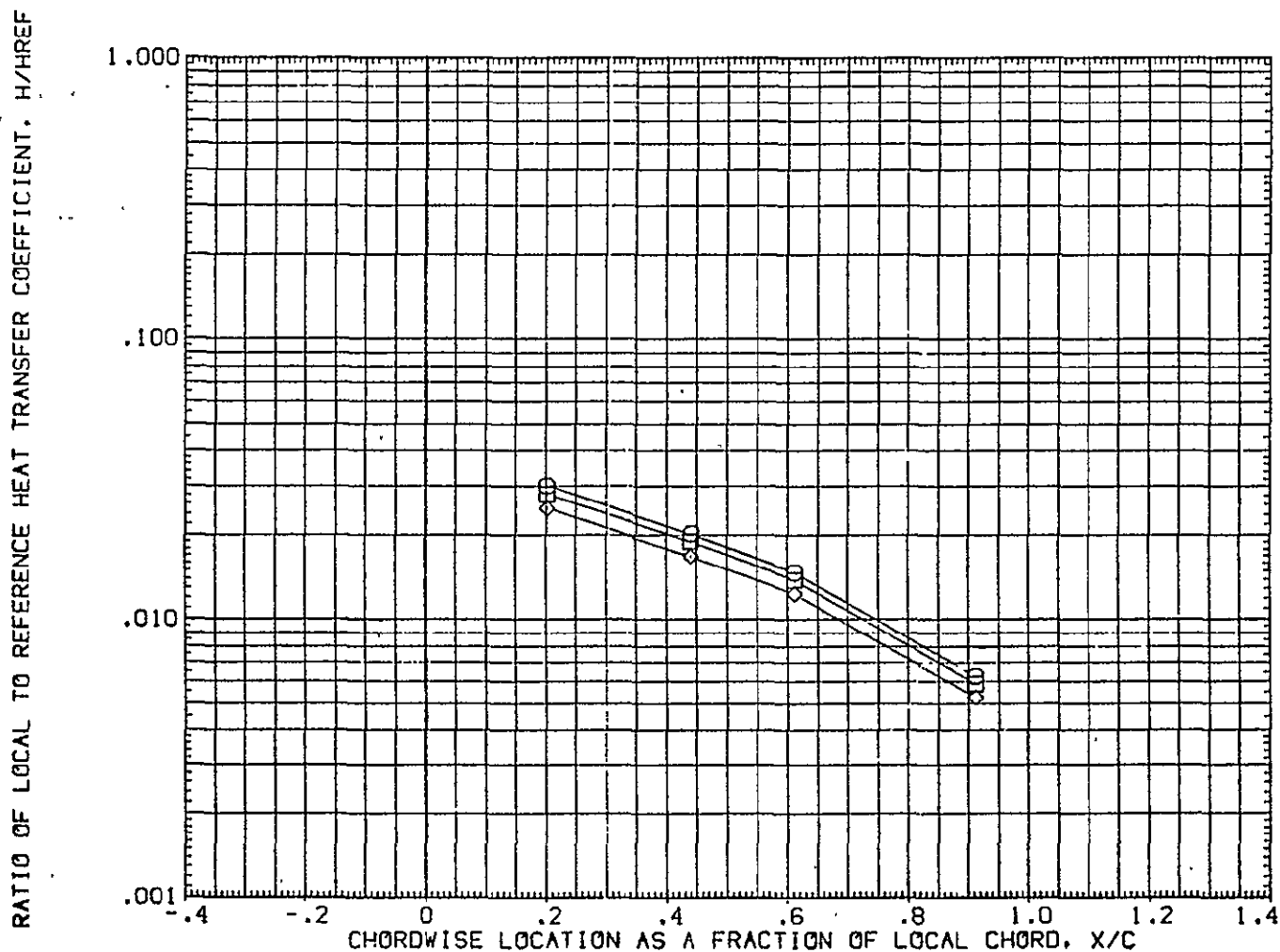


FIG. 12 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER ALPHA = 5

0H12/IH21 (CAL HST I73-100) 37 0 T WING L.S.(RUGW06)

| | | | | | | | |
|--------|--------|------|--------|-------|-------------------|------|------|
| SYMBOL | HAW/HT | 2Y/B | MACH | ALPHA | PARAMETRIC VALUES | BETA | .000 |
| ◇ | .850 | .750 | 19.220 | | | | |
| □ | .900 | | | | | | |
| ○ | 1.000 | | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

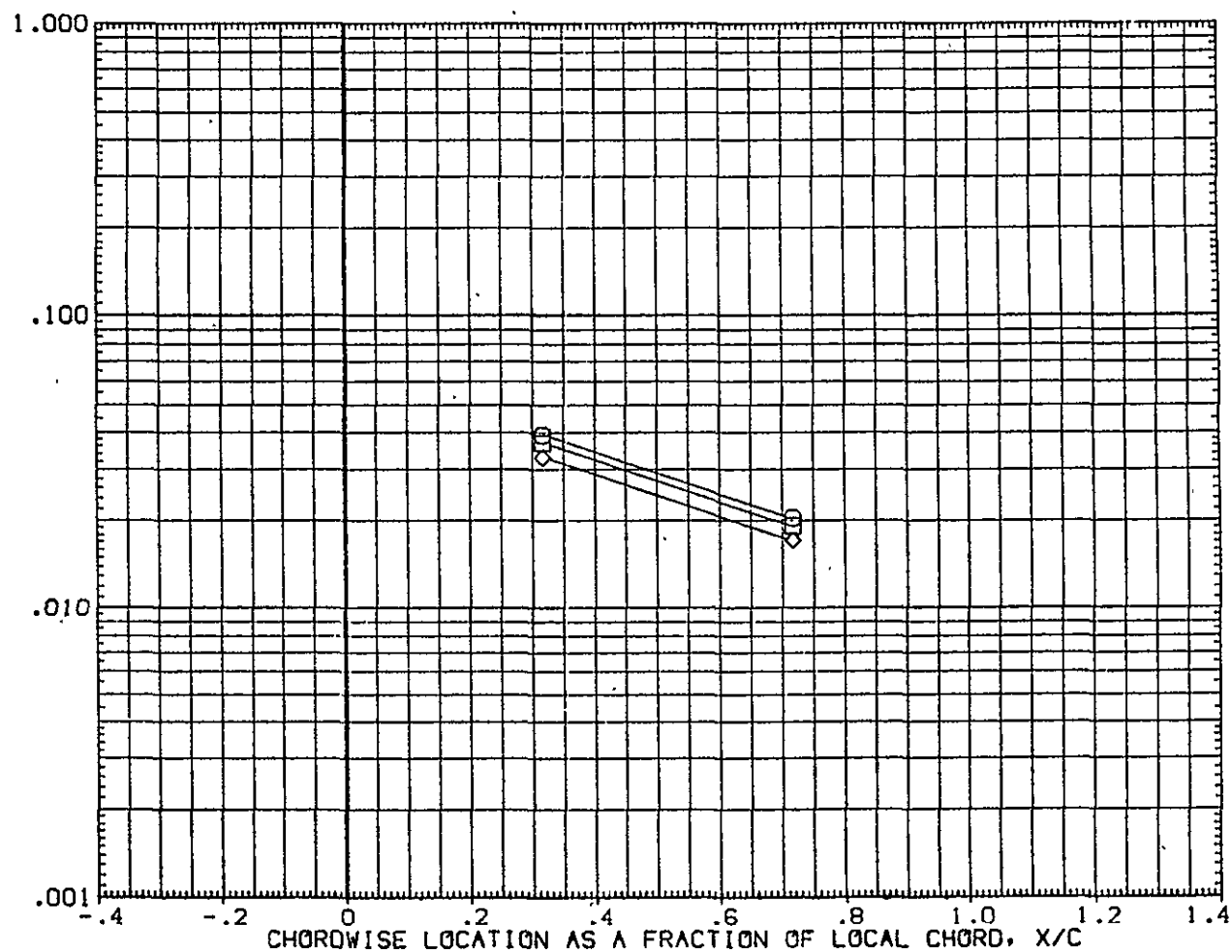


FIG. 12 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER ALPHA = 5

OH12/IH21 (CAL HST I73-100) 37 0 T WING L.S.(RUGW06)

| | | | | |
|--------|--------|------|--------|-----------------------|
| SYMBOL | HAW/HT | 2Y/B | MACH | PARAMETRIC VALUES |
| ○ | .850 | .950 | 19.220 | ALPHA 5.000 BETA .000 |
| □ | .900 | | | |
| ◇ | 1.000 | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

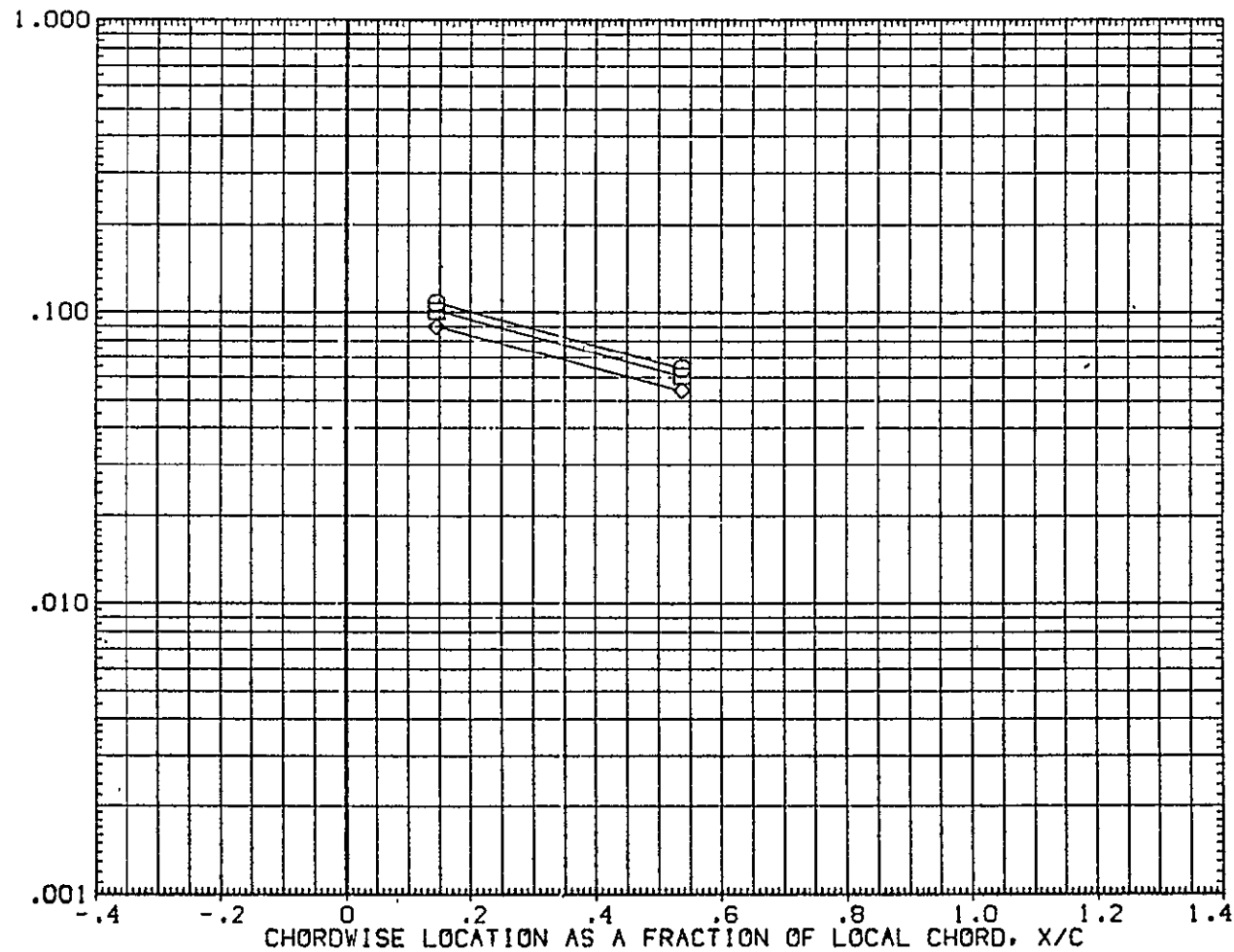


FIG. 12 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER ALPHA = 5

0H12 + IH21 MODEL 37 0T(06)/0(08) WING L.S. (IUGW06)

SYMBOL
O
HAW/HT
.900
2Y/B
.250
MACH
19.170

PARAMETRIC VALUES
ALPHA
5.000
BETA
.000

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, H_i/H_u

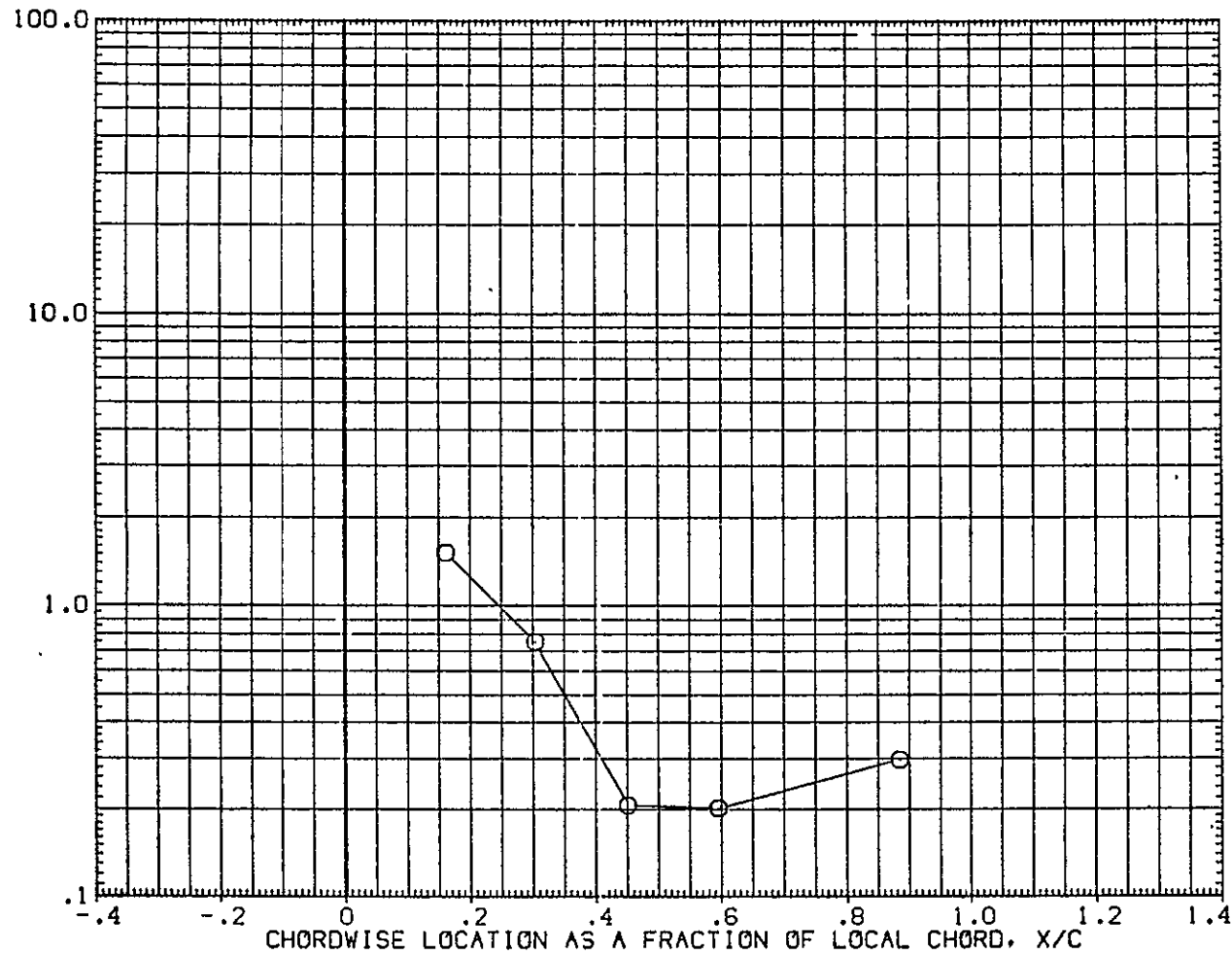


FIG. 12 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER ALPHA = 5

OH12 + IH21 MODEL 37 OT(06)/O(08) WING L.S. (IUGW06)

| | | | | | | | |
|--------|--------|------|--------|-------|-------------------|------|------|
| SYMBOL | HAW/HT | 2Y/B | MACH | ALPHA | PARAMETRIC VALUES | BETA | |
| ○ | .900 | .400 | 19.170 | 5.000 | | | .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, H_i/H_u

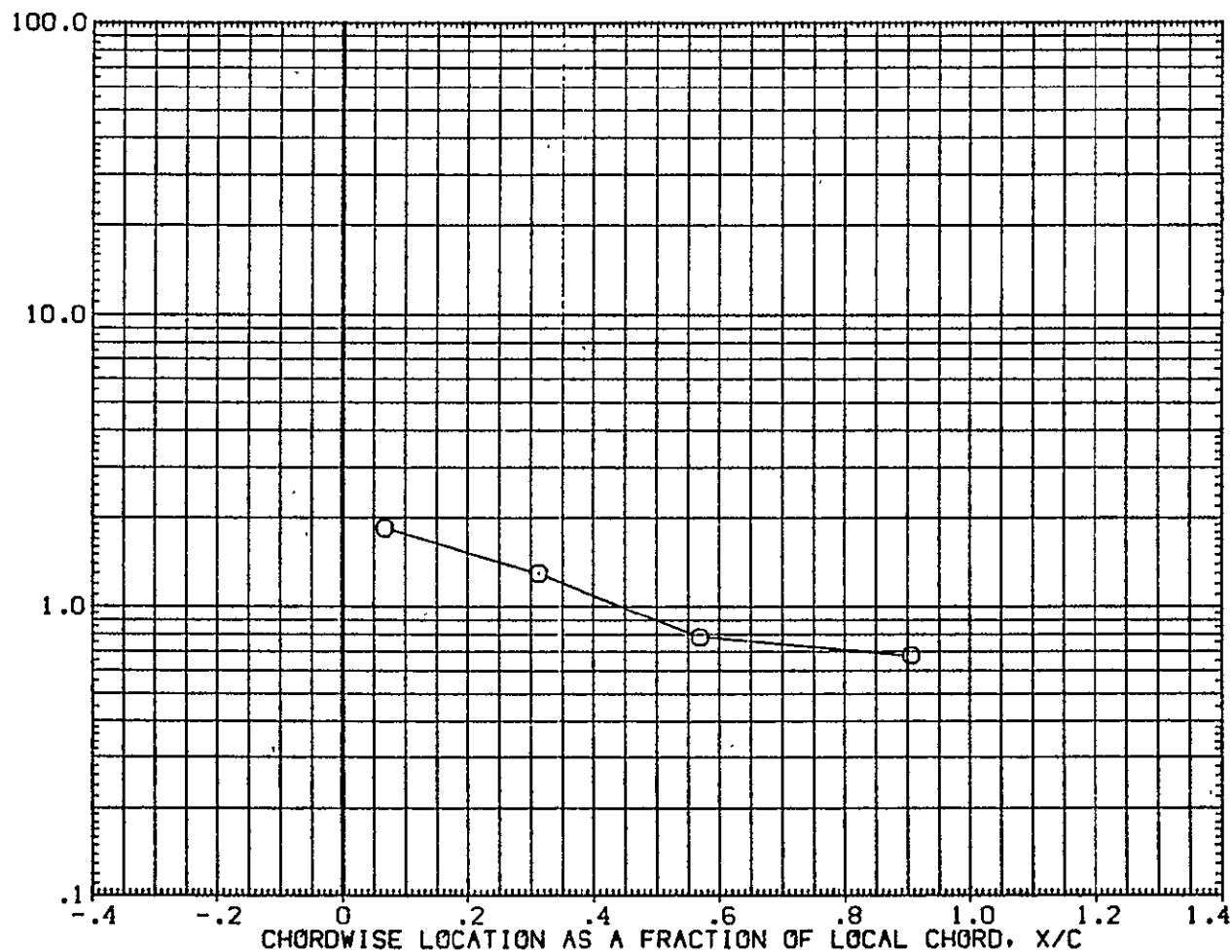


FIG. 12 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER ALPHA = 5

OH12 + IH21 MODEL 37 OT(06)/O(08) WING L.S. (IUGW06)

| | | | | | | |
|--------|--------|------|--------|-------------------|-------|-----------|
| SYMBOL | HAW/HT | 2Y/B | MACH | PARAMETRIC VALUES | | |
| O | .900 | .500 | 19.170 | ALPHA | 5.000 | BETA .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, H_i/H_u

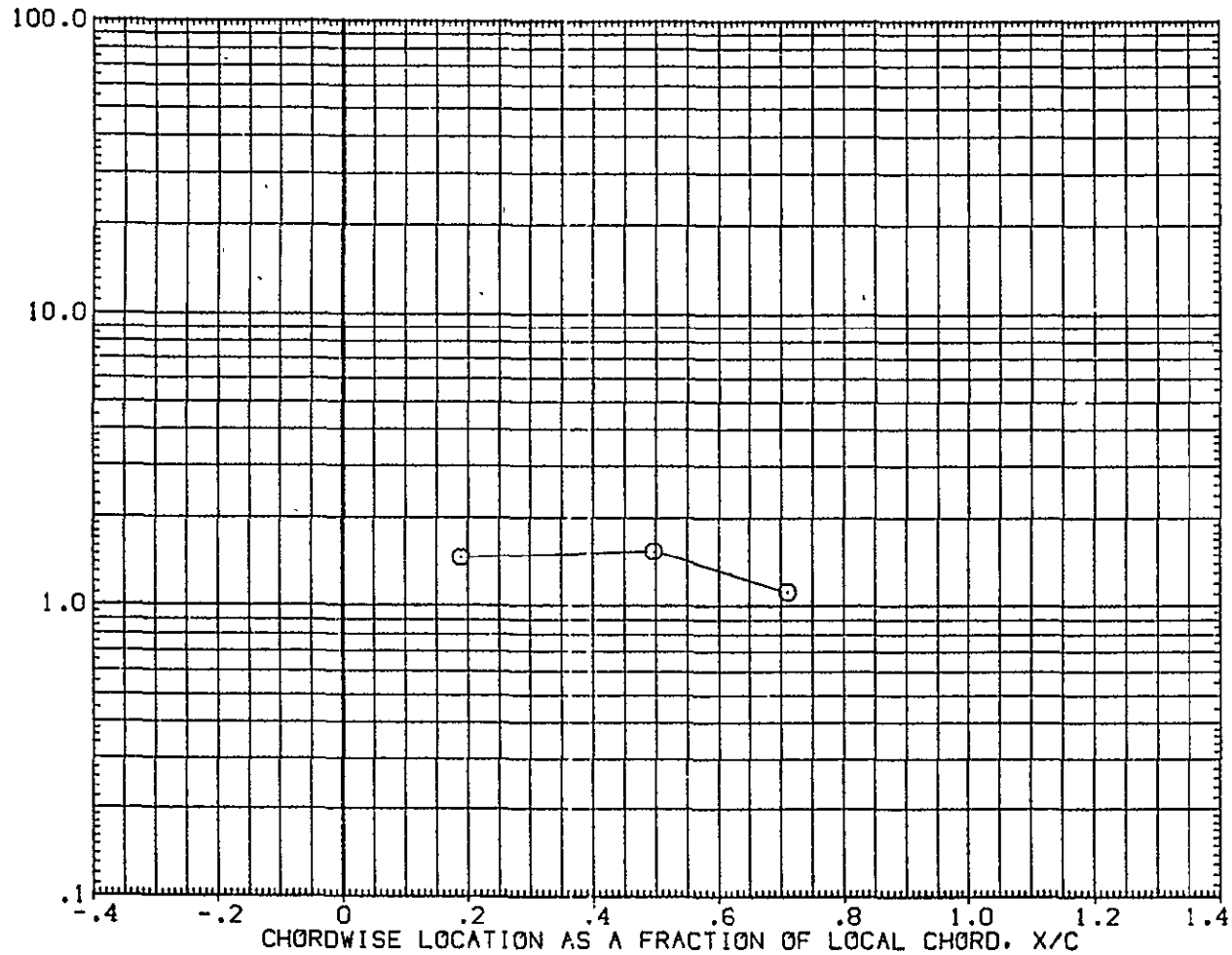


FIG. 12 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER ALPHA = 5

0H12 + 1H21 MODEL 37 OT(06)/O(08) WING L.S. (JUGW06)

| | | | | | | | |
|--------|--------|------|--------|-------|-------------------|------|--|
| SYMBOL | HAW/HT | ZY/B | MACH | ALPHA | PARAMETRIC VALUES | BETA | |
| ○ | .900 | .600 | 19.170 | 5.000 | | .000 | |

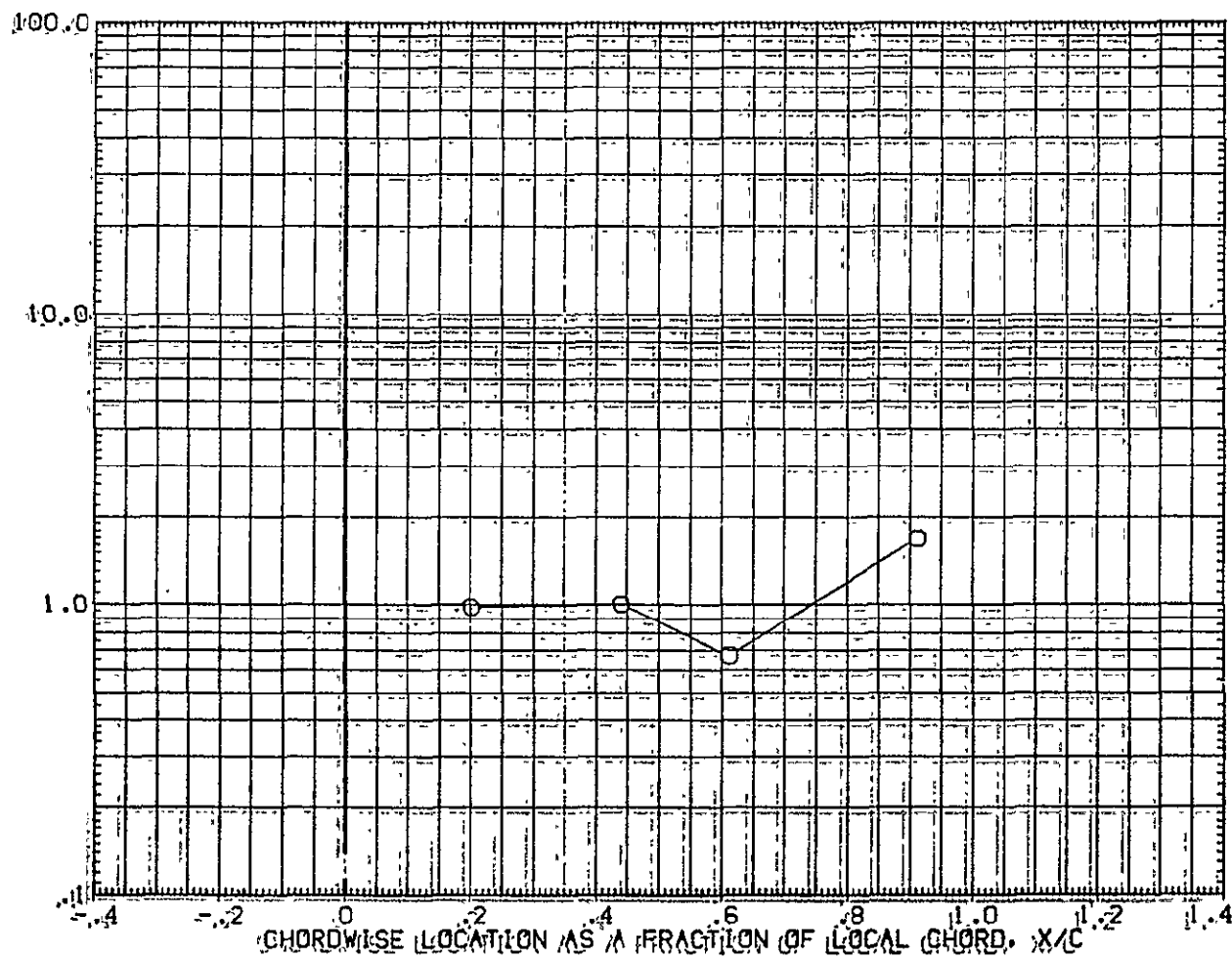


FIG. 112 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER ALPHA = 5

REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR

0H12 + 1H21 MODEL 37 0T(06)/0(08) WING L.S. (IUGW06)

| | | | | | | |
|--------|--------|------|--------|-------------------|-------|-----------|
| SYMBOL | HAW/HT | 2Y/B | MACH | PARAMETRIC VALUES | | |
| ○ | .900 | .750 | 19.170 | ALPHA | 5.000 | BETA .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, H_i/H_u

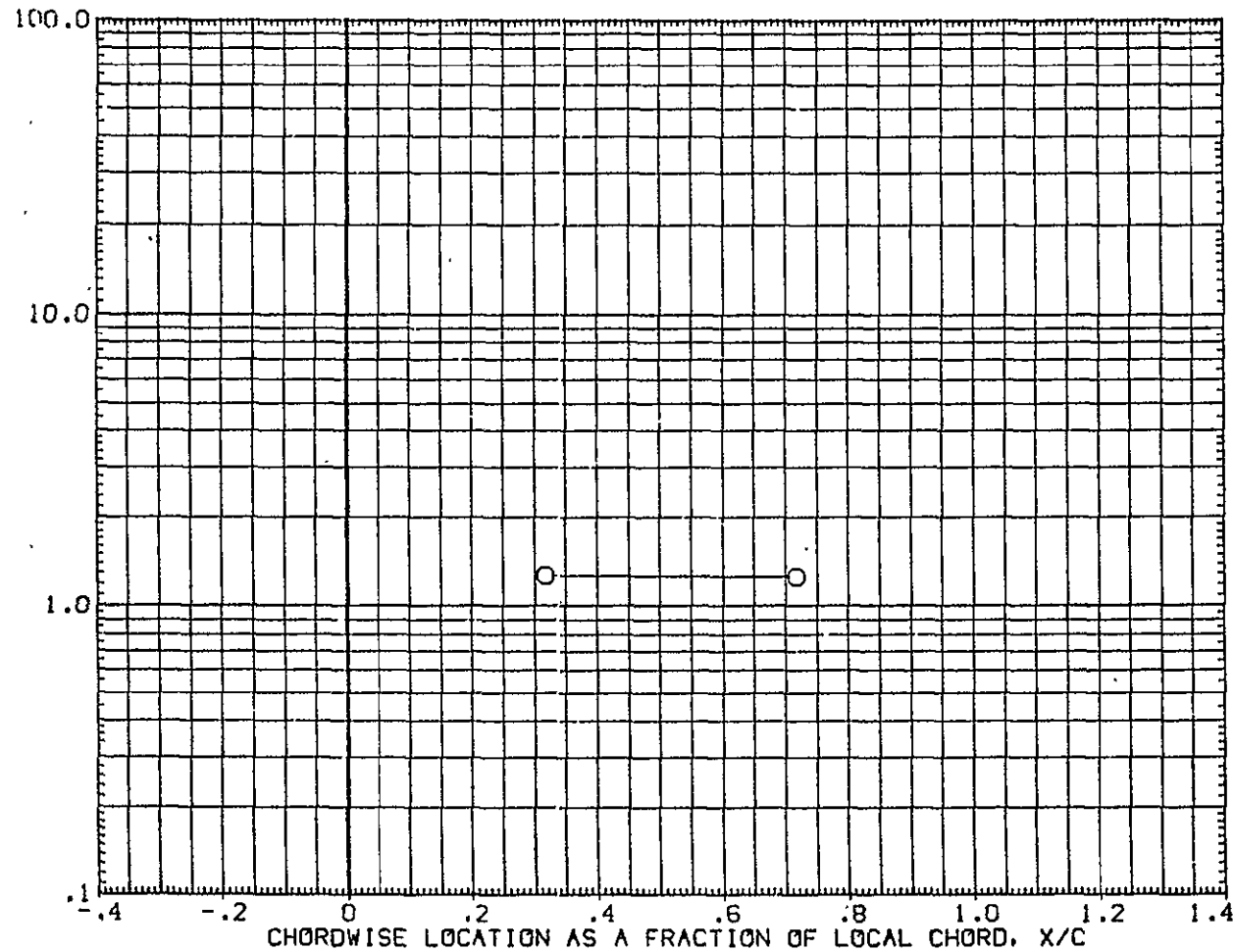


FIG. 12 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER ALPHA = 5

OH12 + IH21 MODEL 37 OT(06)/O(08) WING L.S. (IUGW06)

| | | | | | | |
|--------|--------|------|--------|-------------------|-------|-----------|
| SYMBOL | MAW/HT | 2Y/B | MACH | PARAMETRIC VALUES | | |
| O | .900 | .950 | 19.170 | ALPHA | 5.000 | BETA .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU

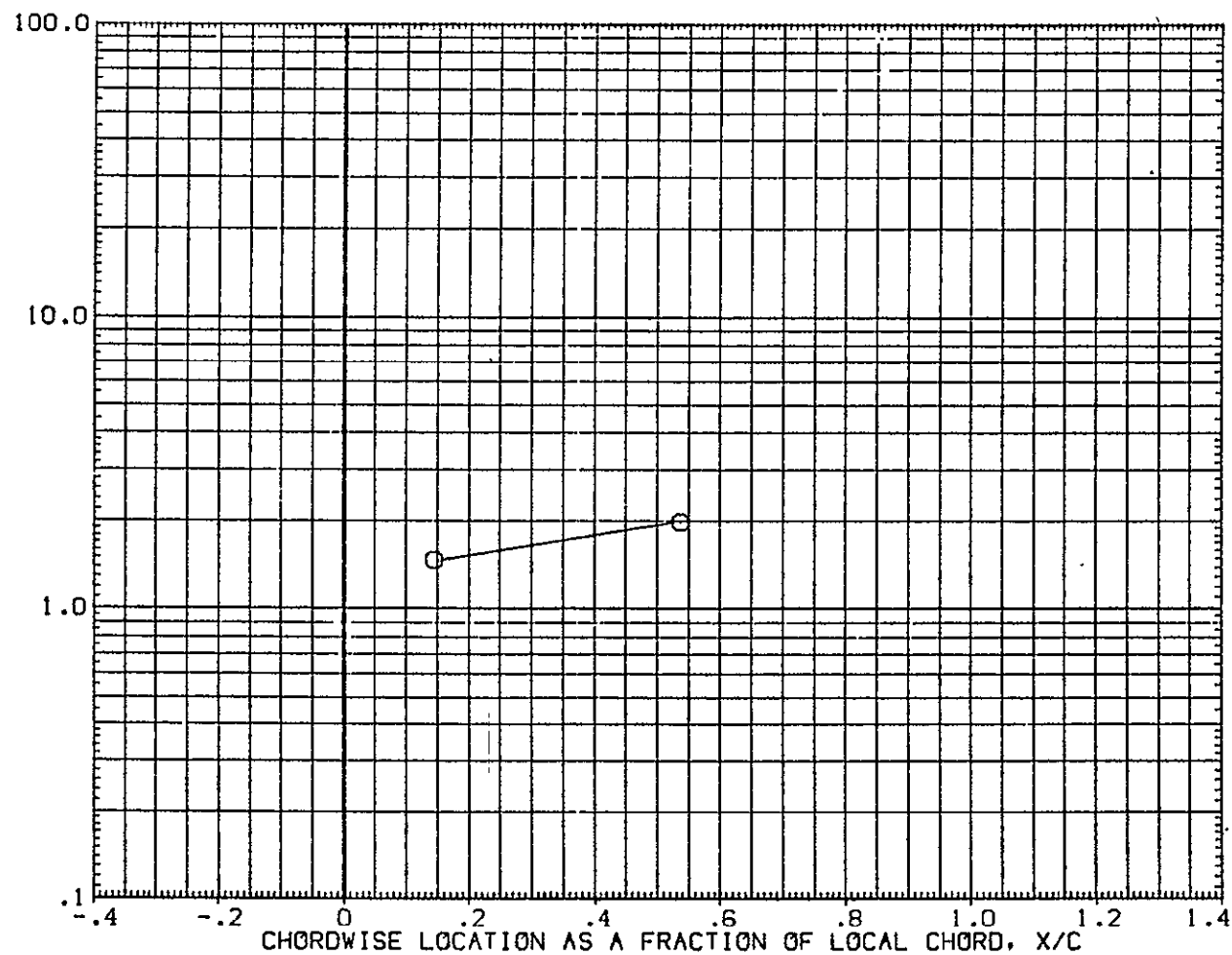


FIG. 12 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER ALPHA = 5

CH12/IH21 (CAL HST 173-100) 37 0

VERTICAL (RUGV08)

| SYMBOL | MAW/HT | GAGEND | MACH | PARAMETRIC VALUES |
|--------|--------|--------|--------|------------------------|
| ◇ | .850 | 40.000 | 19.180 | ALPHA* 5.000 BETA .000 |
| □ | .900 | | | |
| ○ | 1.000 | | | |

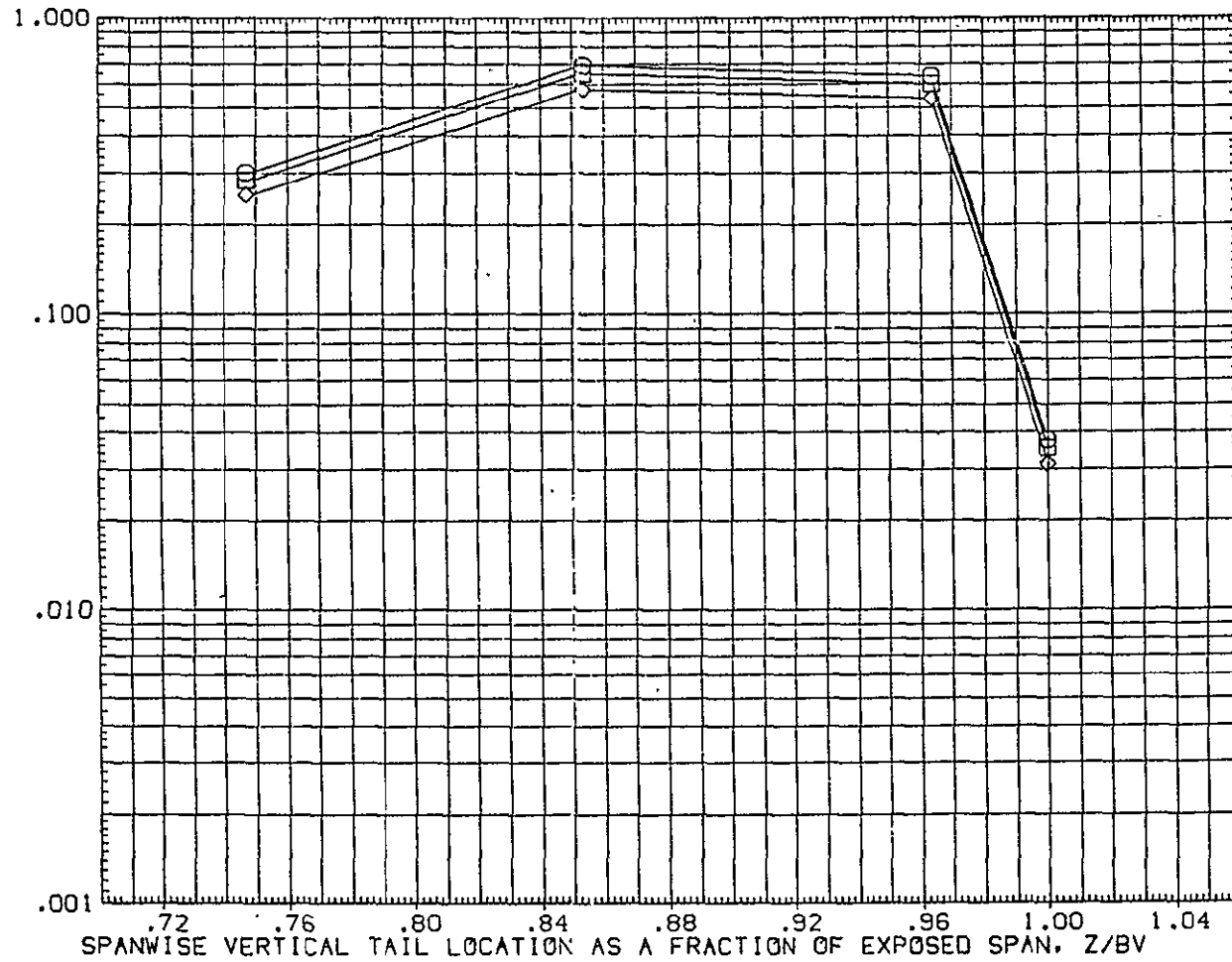
RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF} 

FIG. 13 EFFECT OF RECOVERY FACTOR ON THE ORBITER TAIL HEAT TRANSFER ALPHA = 5

0H12/1H21 (CAL HST 173-100) 37 0 T VERTICAL (RUGV06)

| | | | | | | |
|--------|--------|--------|--------|-------|-------------------|------|
| SYMBOL | HAW/HT | GAGENO | MACH | ALPHA | PARAMETRIC VALUES | |
| ○ | .850 | 40.000 | 19.220 | 5.000 | BETA | .000 |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

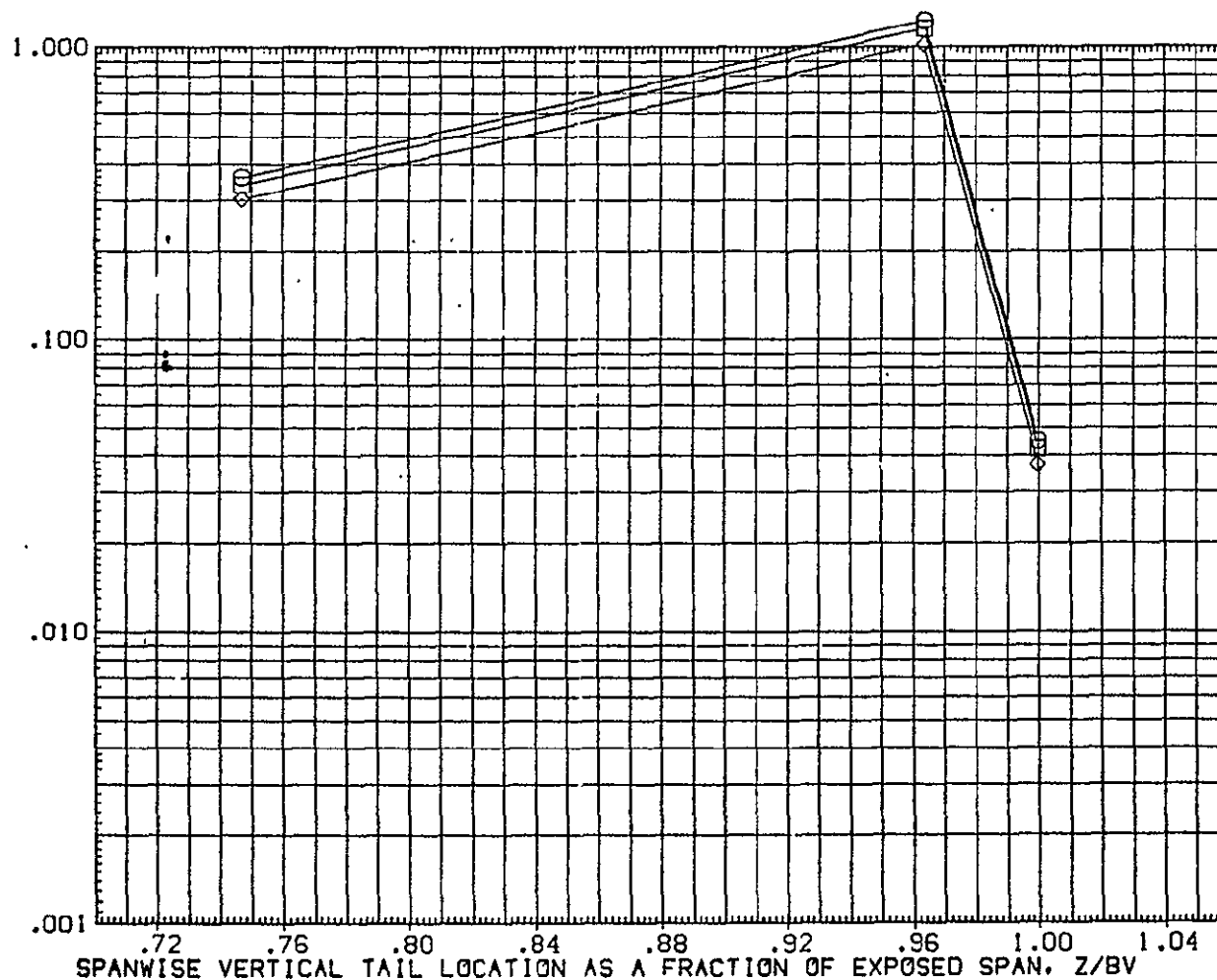


FIG. 13 EFFECT OF RECOVERY FACTOR ON THE ORBITER TAIL HEAT TRANSFER ALPHA = 5

OH12 + IH21 MODEL 37 OT(06)/O(08) VERTICAL (IUGV06)

| | | | | |
|--------|--------|--------|--------|-----------------------|
| SYMBOL | HAW/HT | GAGENO | MACH | PARAMETRIC VALUES |
| O | .900 | 40.000 | 19.170 | ALPHA 5.000 BETA .000 |

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, H_i/H_u

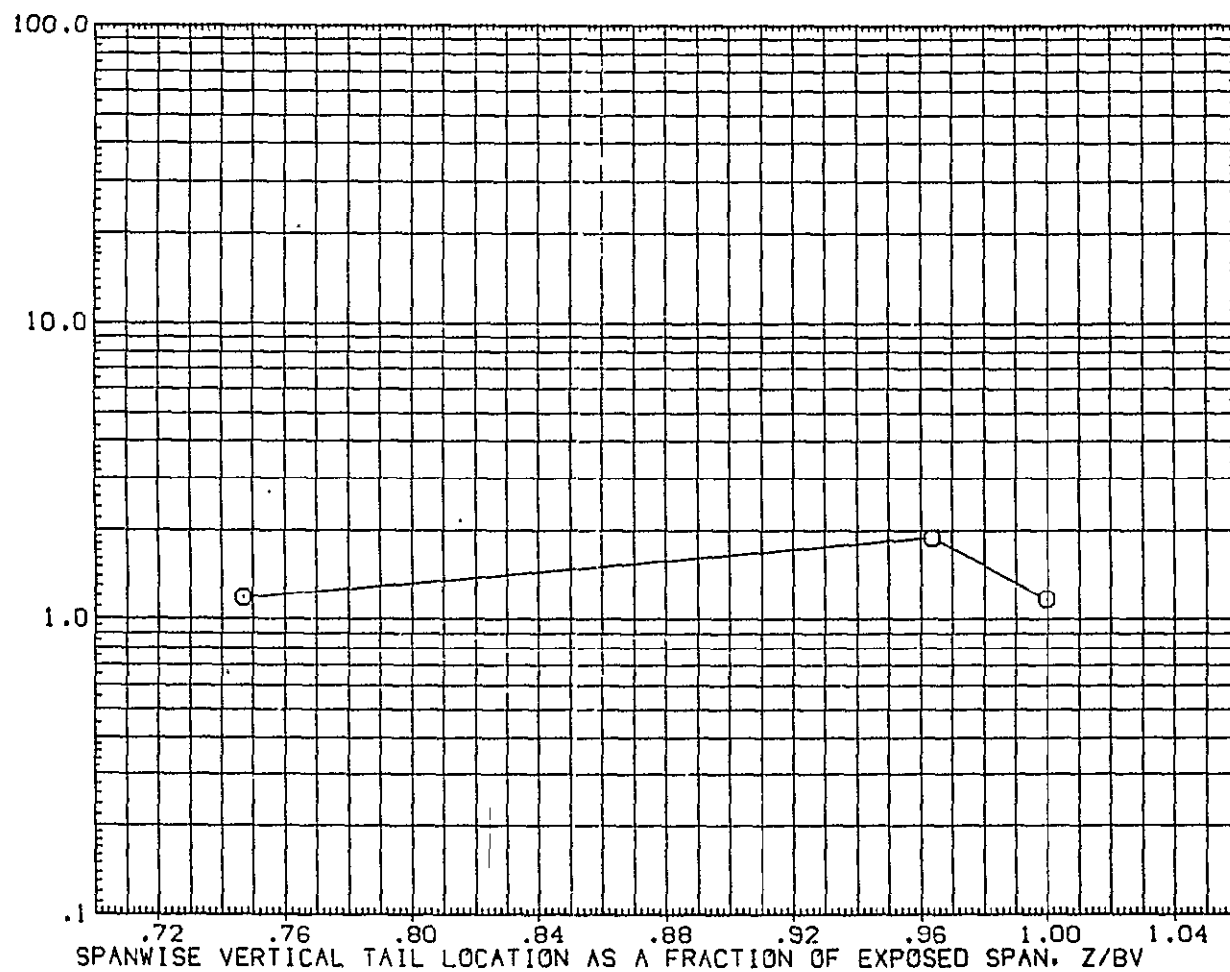


FIG. 13 EFFECT OF RECOVERY FACTOR ON THE ORBITER TAIL HEAT TRANSFER ALPHA = 5

0H12/IH21 (CAL HST 173-100) 37 0 T TANK (RUGT14)

| | | | | | | |
|--------|--------|------|--------|-------|-------------------|------|
| SYMBOL | HAW/HT | PHI | MACH | ALPHA | PARAMETRIC VALUES | |
| ○ | .650 | .000 | 15.700 | | .000 | BETA |
| □ | .900 | | | | | .000 |
| ◇ | 1.000 | | | | | |

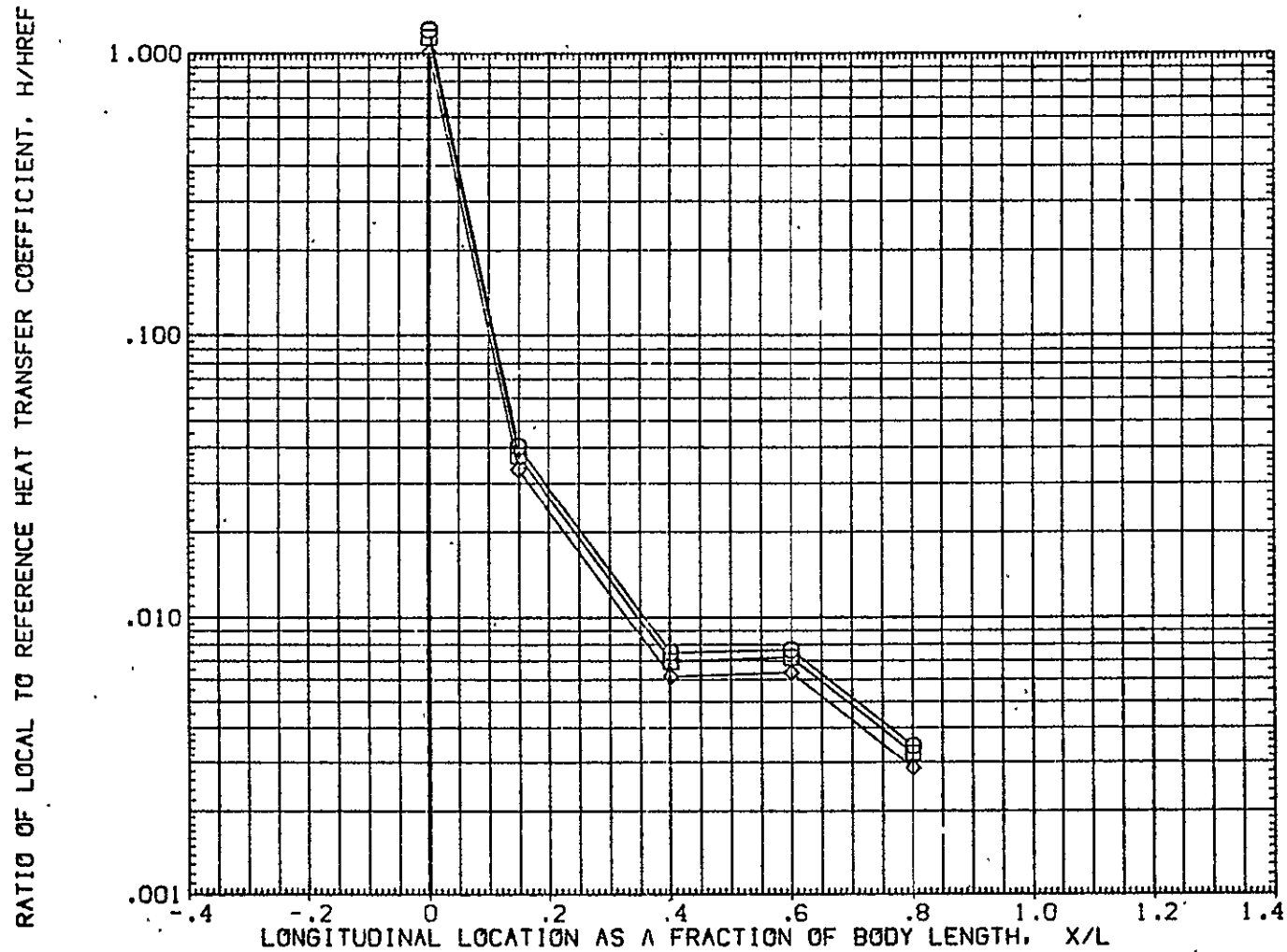


FIG. 14 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L2$ ALPHA = 0

OH12/1H21 (CAL HST 173-100) 37 0 T TANK (RUGT14)

| | | | | | | |
|--------|--------|---------|--------|-------------------|------|------|
| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
| ◇ | .850 | 180.000 | 15.700 | ALPHA | .050 | BETA |
| □ | .900 | | | | | .000 |
| ◇ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, h/h_{REF}

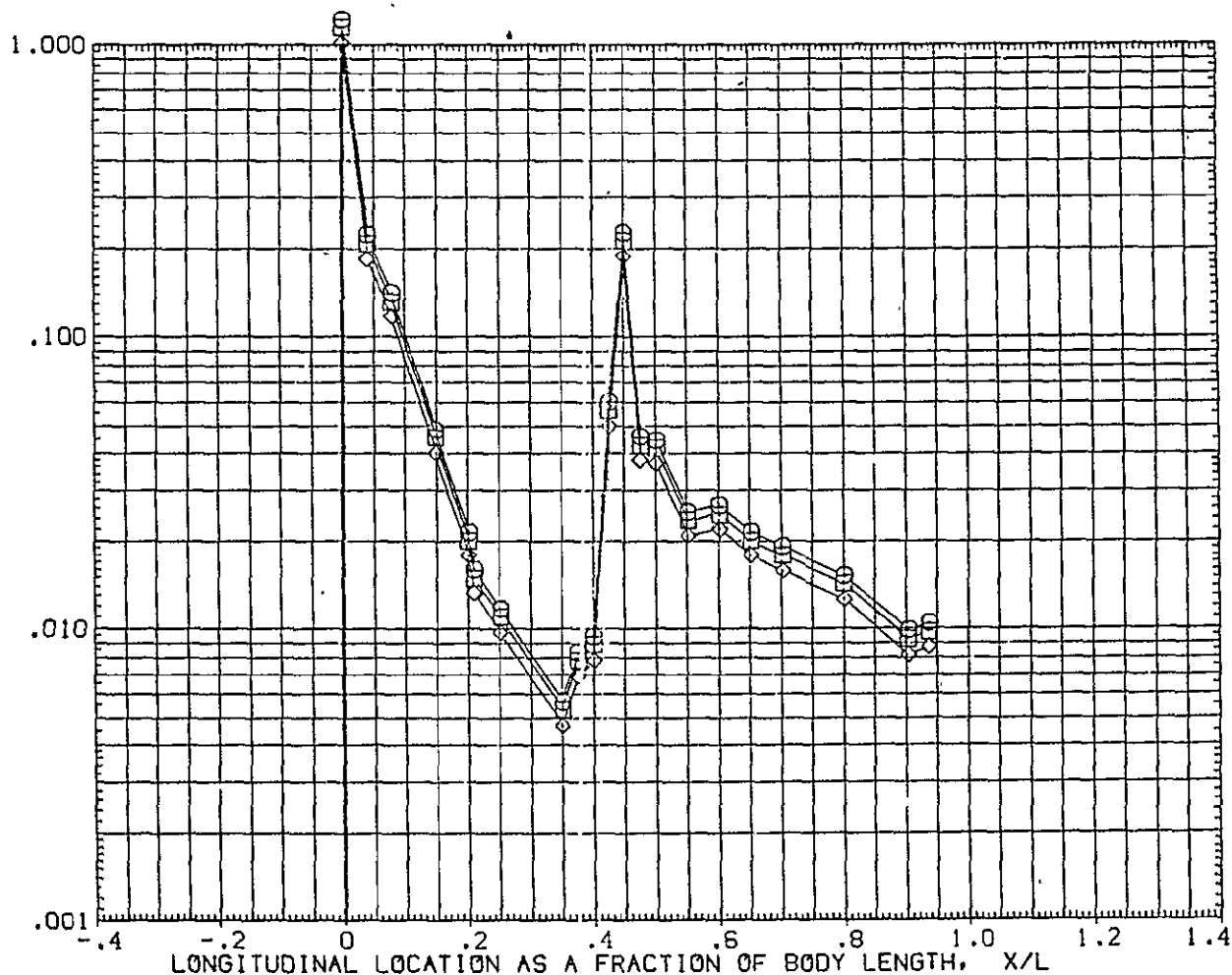


FIG. 14 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L2$ ALPHA = 0

OH12/IH21 (CAL HST 173-100) 37 0 T TANK (RUGT14)

| | | | | | | |
|--------|--------|---------|--------|-------------------|------|------|
| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
| ○ | .850 | 199.000 | 15.700 | ALPHA | .000 | BETA |
| □ | .900 | | | | | .000 |
| ◇ | 1.000 | | | | | |

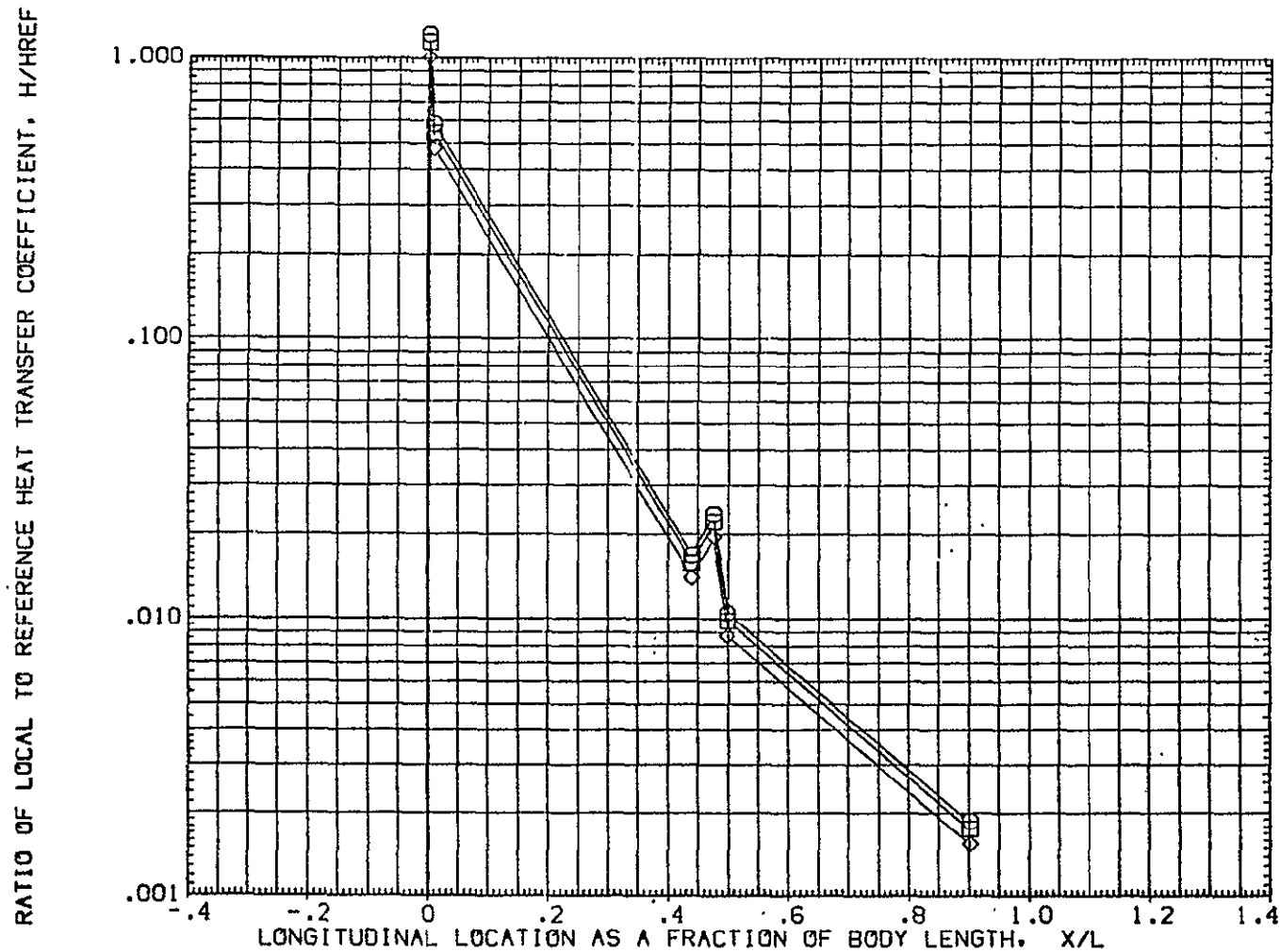


FIG. 14 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L2$ ALPHA = 0

OH12/IH21 (CAL HST 173-100) 37 0 T TANK (RUGT14)

| SYMBOL | HAY/HT | PHI | MACH | PARAMETRIC VALUES |
|--------|--------|---------|--------|----------------------|
| ○ | .850 | 221.000 | 15.700 | ALPHA .000 BETA .000 |
| □ | .900 | | | |
| ◇ | 1.000 | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

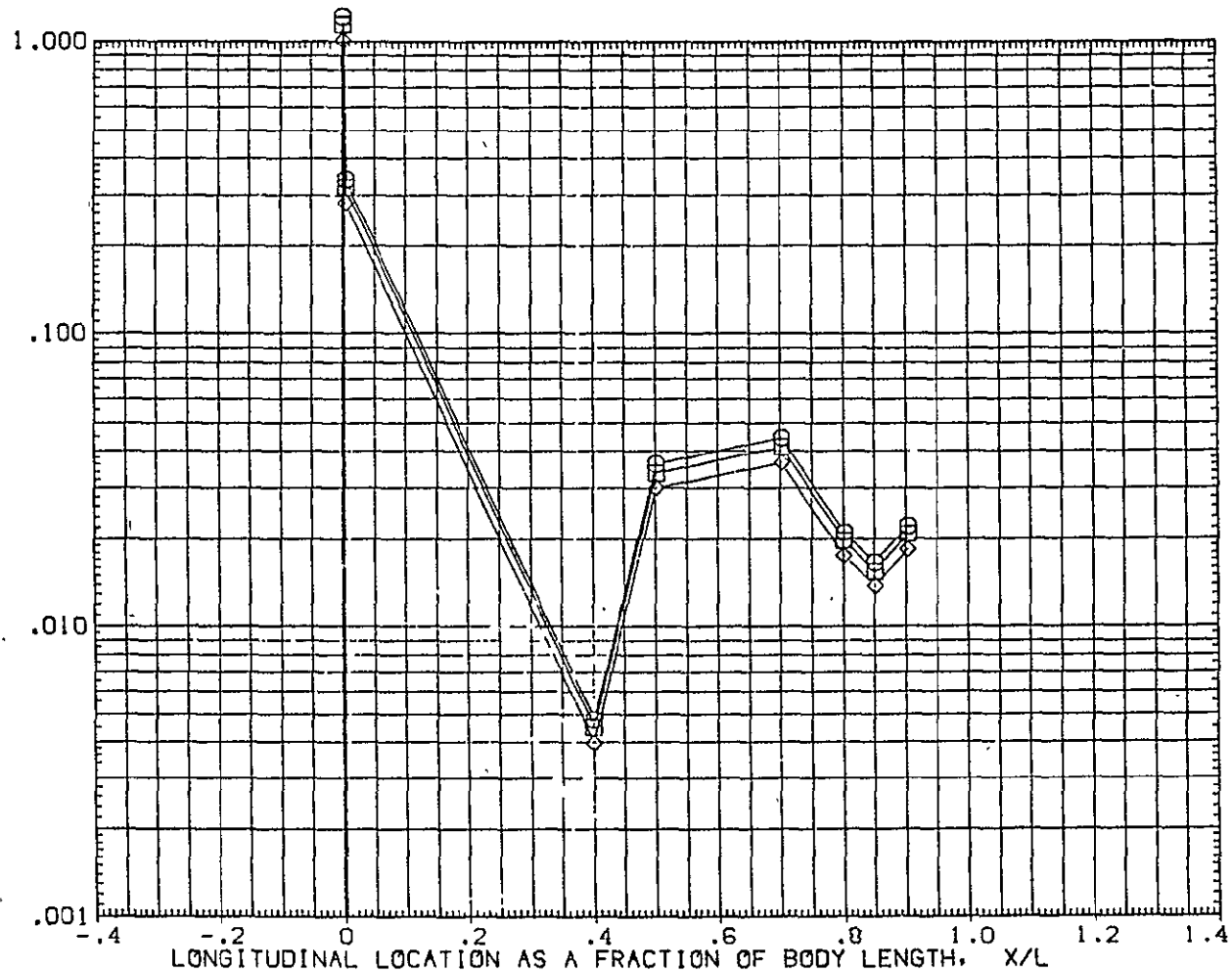


FIG. 14 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L2$ ALPHA = 0

GH12/IH21 (CAL HST 173-100) 37 0 T TANK (RUGT14)

| | | | | | | |
|--------|--------|---------|--------|-------------------|------|------|
| SYMBOL | RAV/HT | PHI | MACH | PARAMETRIC VALUES | | |
| ○ | .850 | 241.000 | 15.700 | ALPHA | .000 | BETA |
| □ | .900 | | | | | .000 |
| ◇ | 1.000 | | | | | |

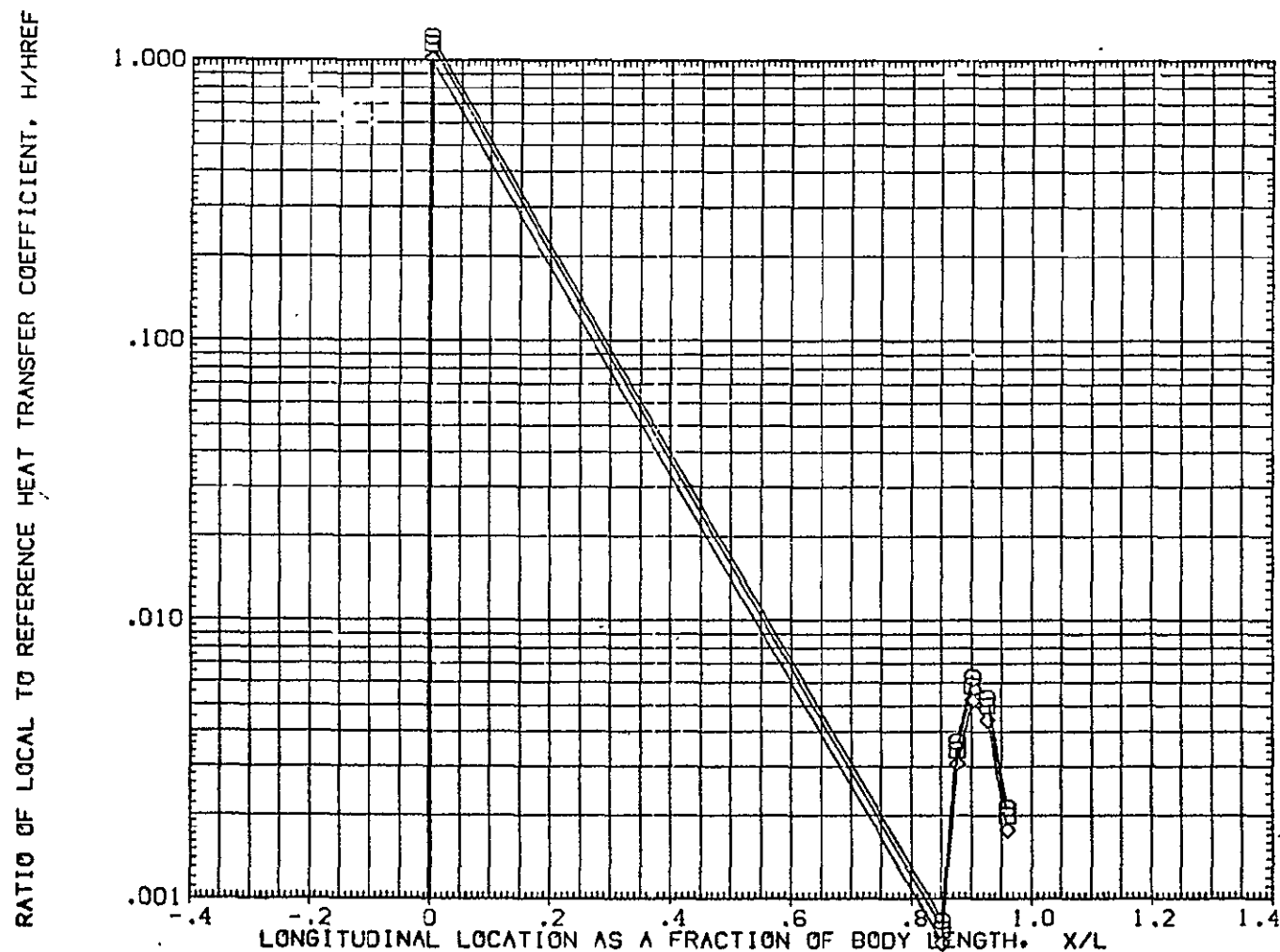


FIG. 14 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L2$ $\alpha = 0$

0412/1H21 (CAL HST 173-100) 37 0 T TANK (RUGT14)

| SYMBOL | HAW/HT | PHI | MACH | ALPHA | PARAMETRIC VALUES | BETA |
|--------|--------|---------|--------|-------|-------------------|------|
| ◇ | .850 | 247.000 | 15.700 | .000 | | .000 |
| □ | .900 | | | | | |
| ○ | 1.000 | | | | | |

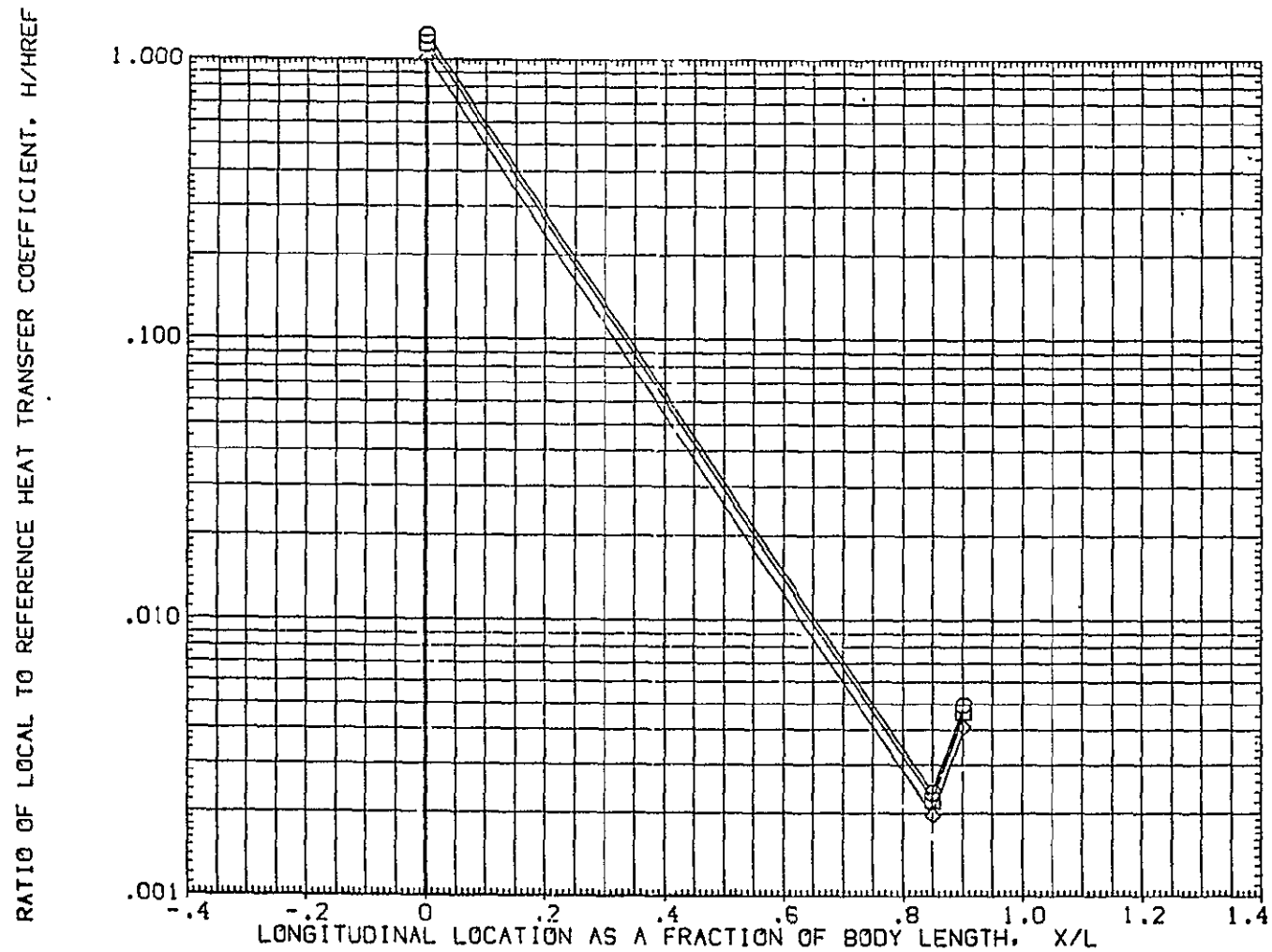


FIG. 14 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L2$ $\alpha = 0$

0H12/1421 (CAL HST 173-100) 37 0 T TANK (RUGT14)

| | | | | | | |
|--------|--------|---------|--------|-------------------|------|-----------|
| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
| ◇ □ ○ | .850 | 270.000 | 15.700 | ALPHA | .000 | BETA .000 |
| | .900 | | | | | |
| | 1.000 | | | | | |

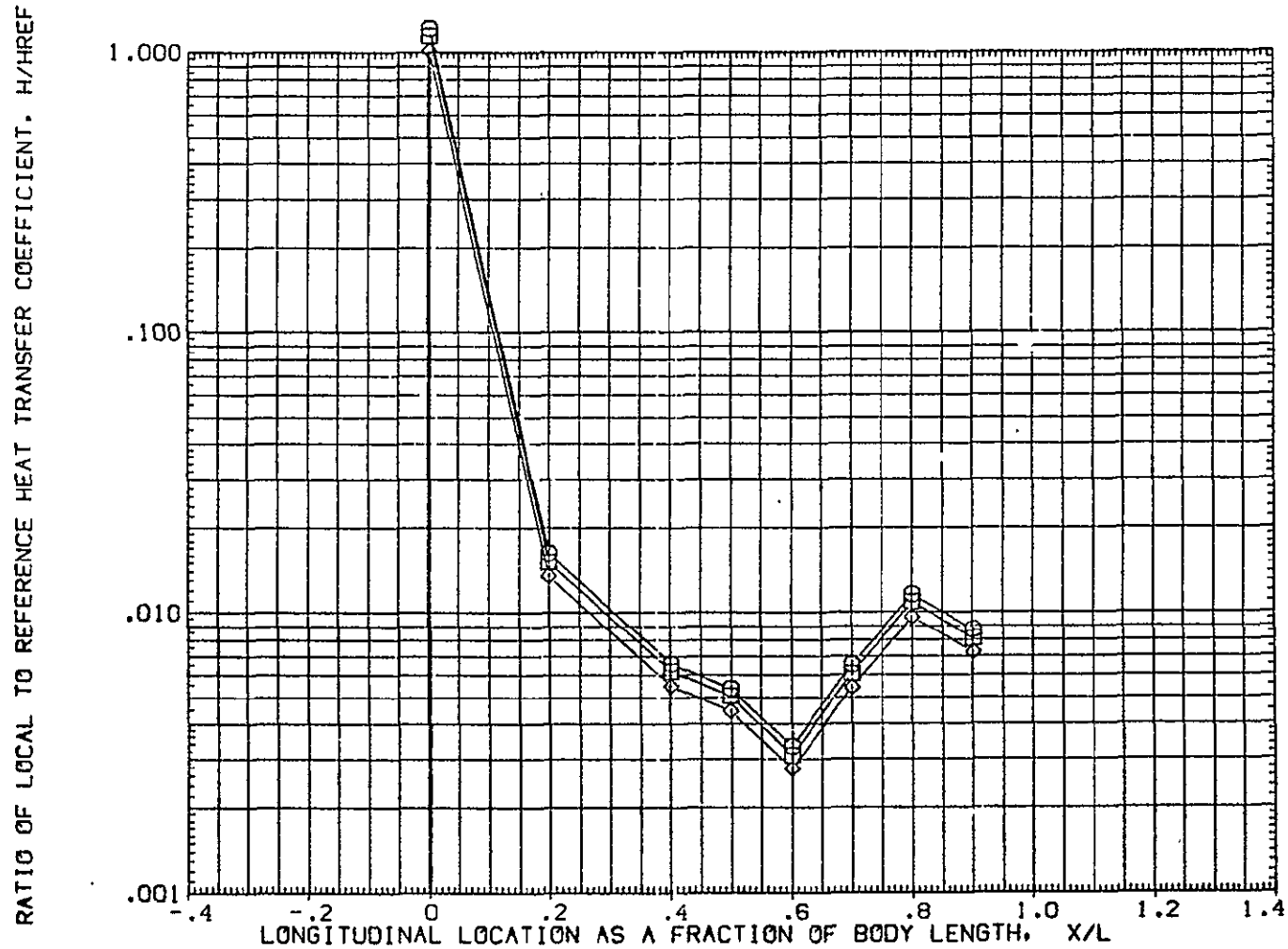


FIG. 14 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L2$ ALPHA = 0

OH12/1H21 (CAL HST 173-100) 37 0 T TANK (RUGT14)

| SYMBOL | HAW/HT | PHI | MACH | ALPHA | PARAMETRIC VALUES | BETA | |
|--------|--------|---------|--------|-------|-------------------|------|--|
| ○ | .850 | 315.000 | 15.700 | | | | |
| □ | .900 | | | | | | |
| ◇ | 1.000 | | | | | | |

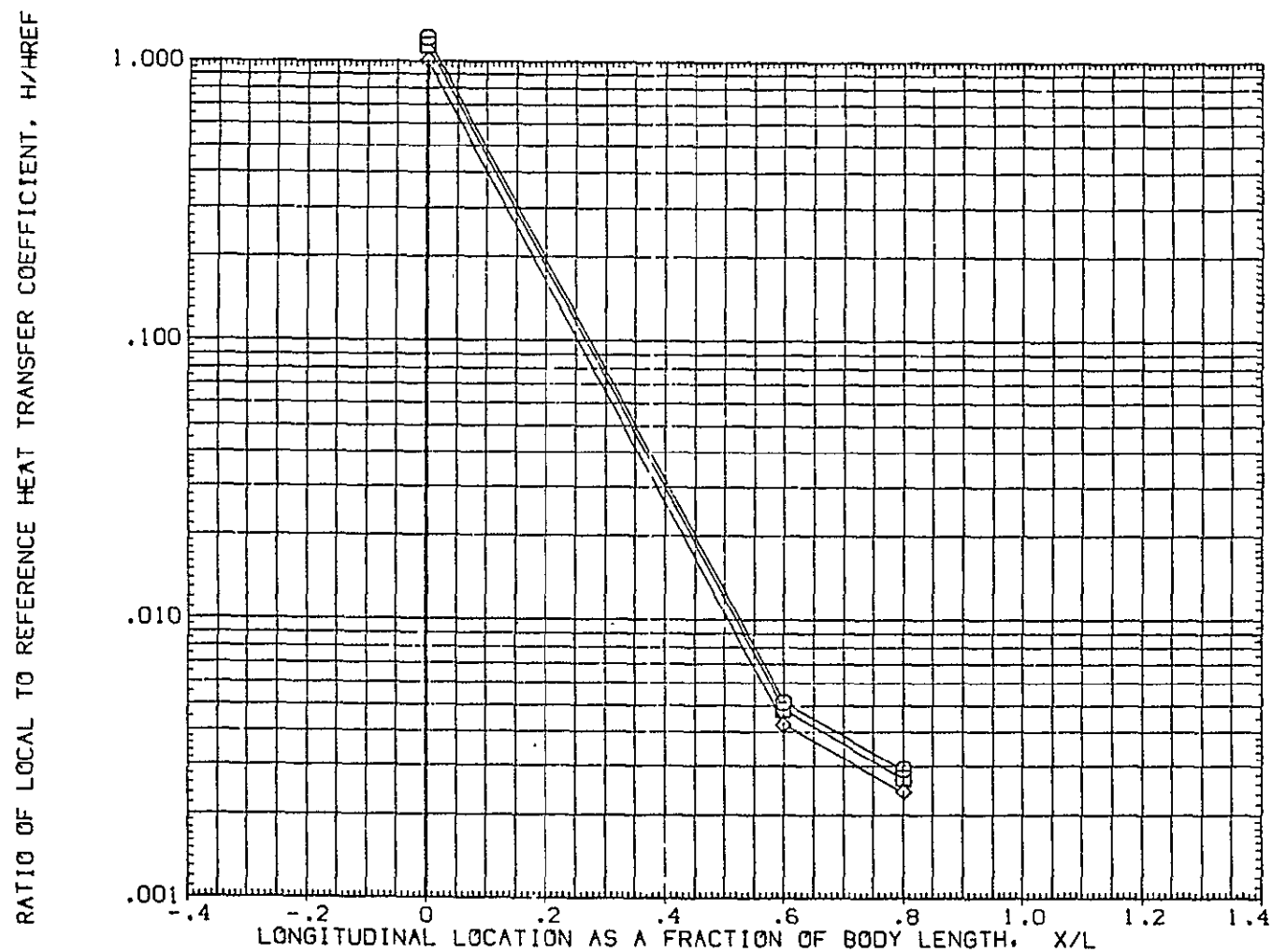


FIG. 14 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L2$ $\alpha = 0$

OH12/IH21 (CAL HST 173-100) 37 0 T TANK (RUGT14)

| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
|--------|--------|------|--------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| ◇ | .850 | .000 | 16.000 | .000 | .000 | .000 |
| □ | .900 | | | | | |
| ○ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

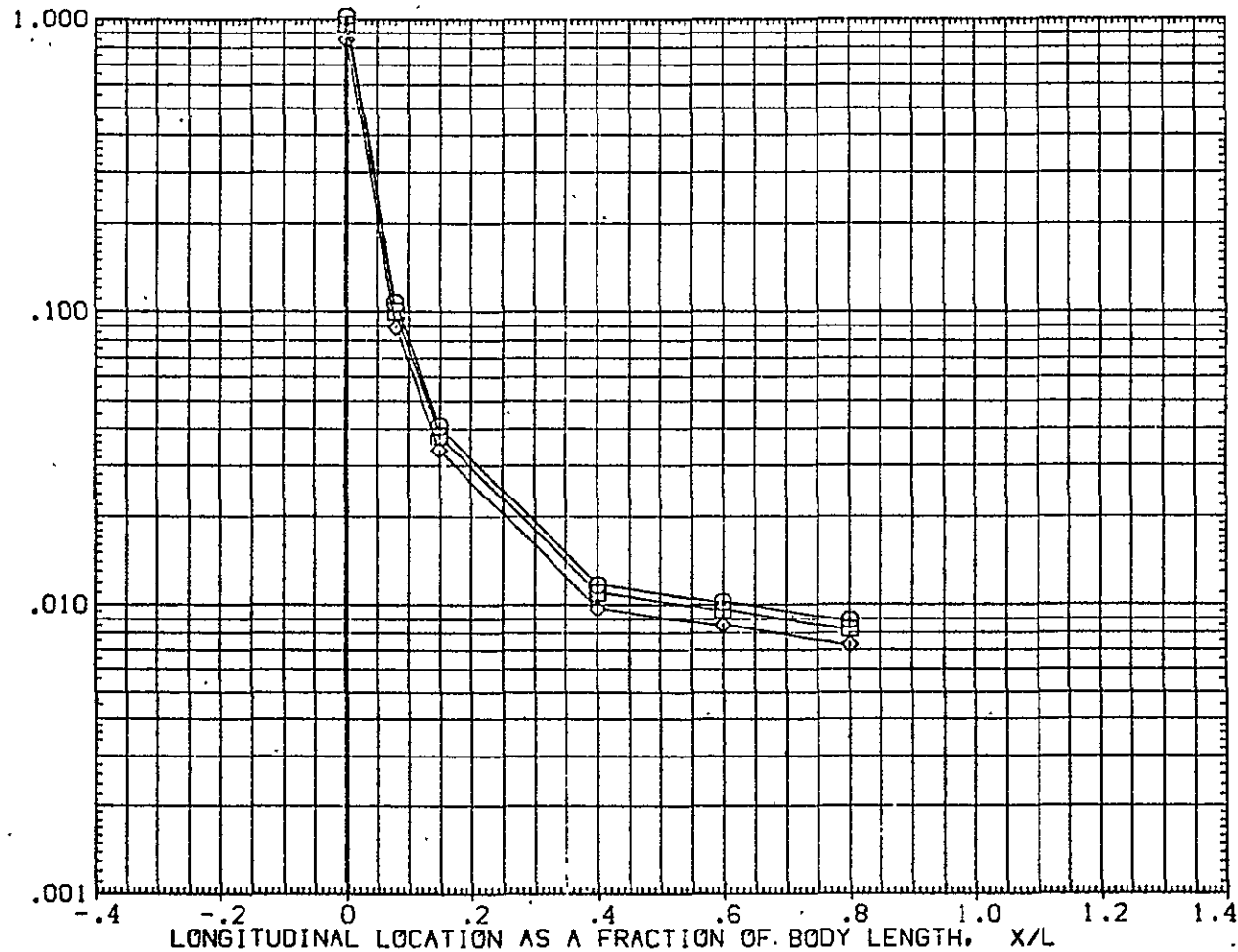


FIG. 14 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER RN/L^2 ALPHA = 0

0412/1H21 (CAL HST 173-100) 37 0 T TANK (RUGT14)

| | | | | | | |
|--------|--------|---------|--------|-------------------|------|------|
| SYMBOL | RAY/H1 | PHI | MACH | PARAMETRIC VALUES | | |
| ○ | .850 | 180.000 | 16.000 | ALPHA | .000 | BETA |
| □ | .900 | | | | | .000 |
| ◇ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

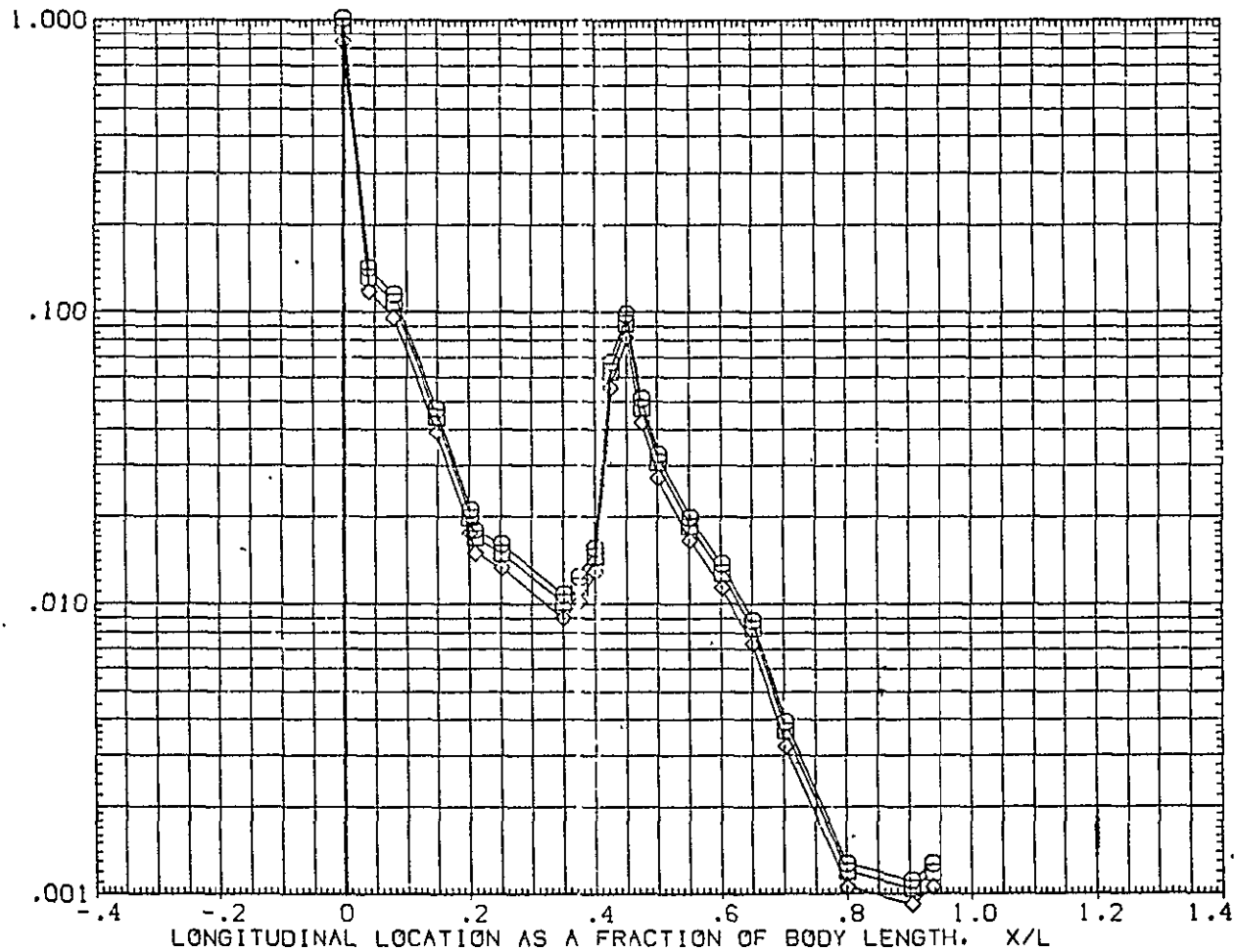


FIG. 14 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L2$ ALPHA = 0

0H12/1H21 (CAL HST 173-100) 37 0 T TANK (RUGT14)

| SYMBOL | MAW/HT | PHI | MACH | PARAMETRIC VALUES |
|--------|--------|---------|--------|----------------------|
| ○ | .850 | 199.000 | 16.000 | ALPHA .000 BETA .000 |
| □ | .900 | | | |
| ◇ | 1.000 | | | |

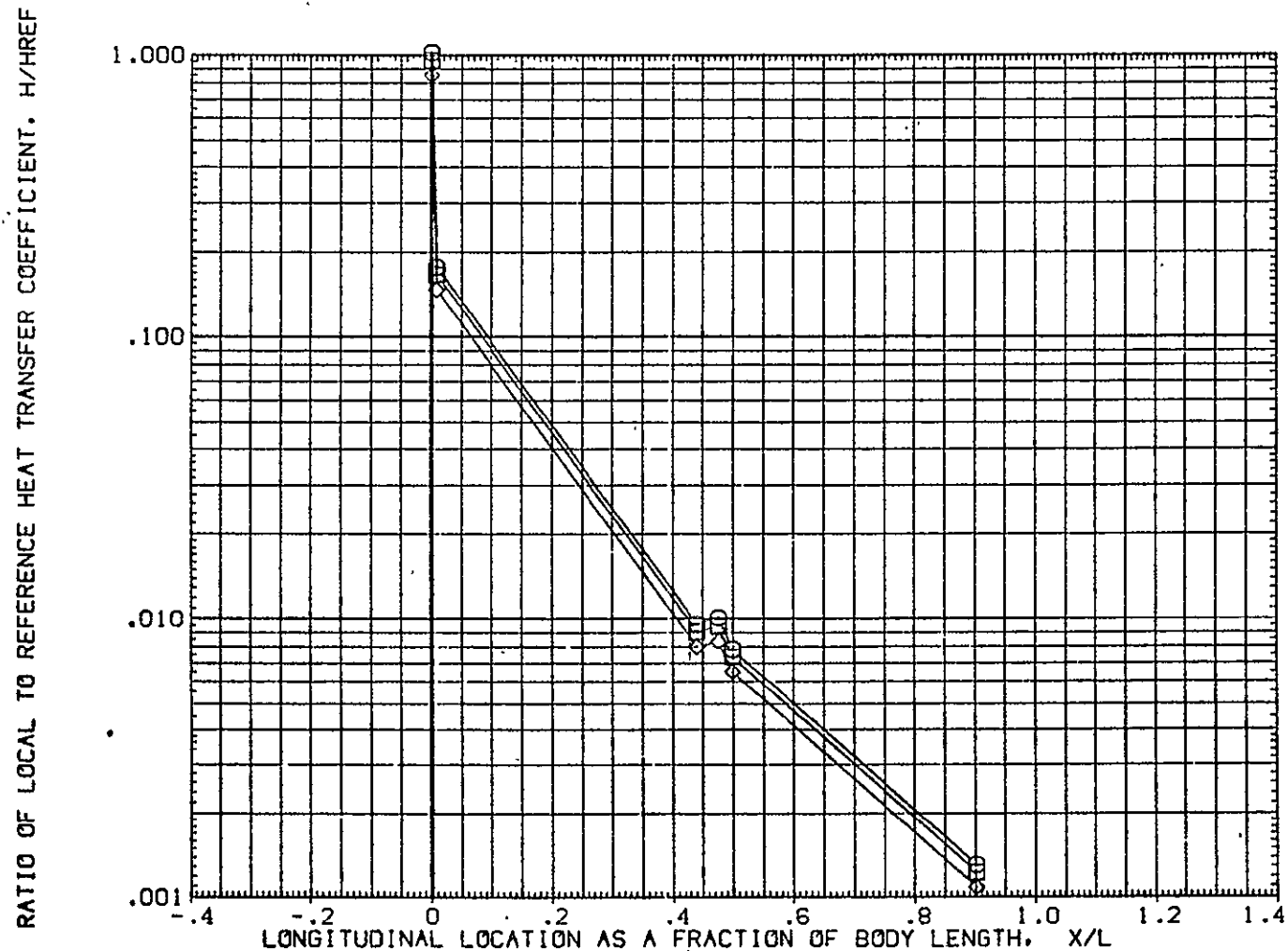


FIG. 14 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L2$ ALPHA = 0

OH12/IH21 (CAL HST 173-100) 37 0 T TANK (RUGT14)

| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
|--------|--------|---------|--------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| ○ | .850 | 221.000 | 16.000 | .000 | | .000 |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, h/h_{REF}

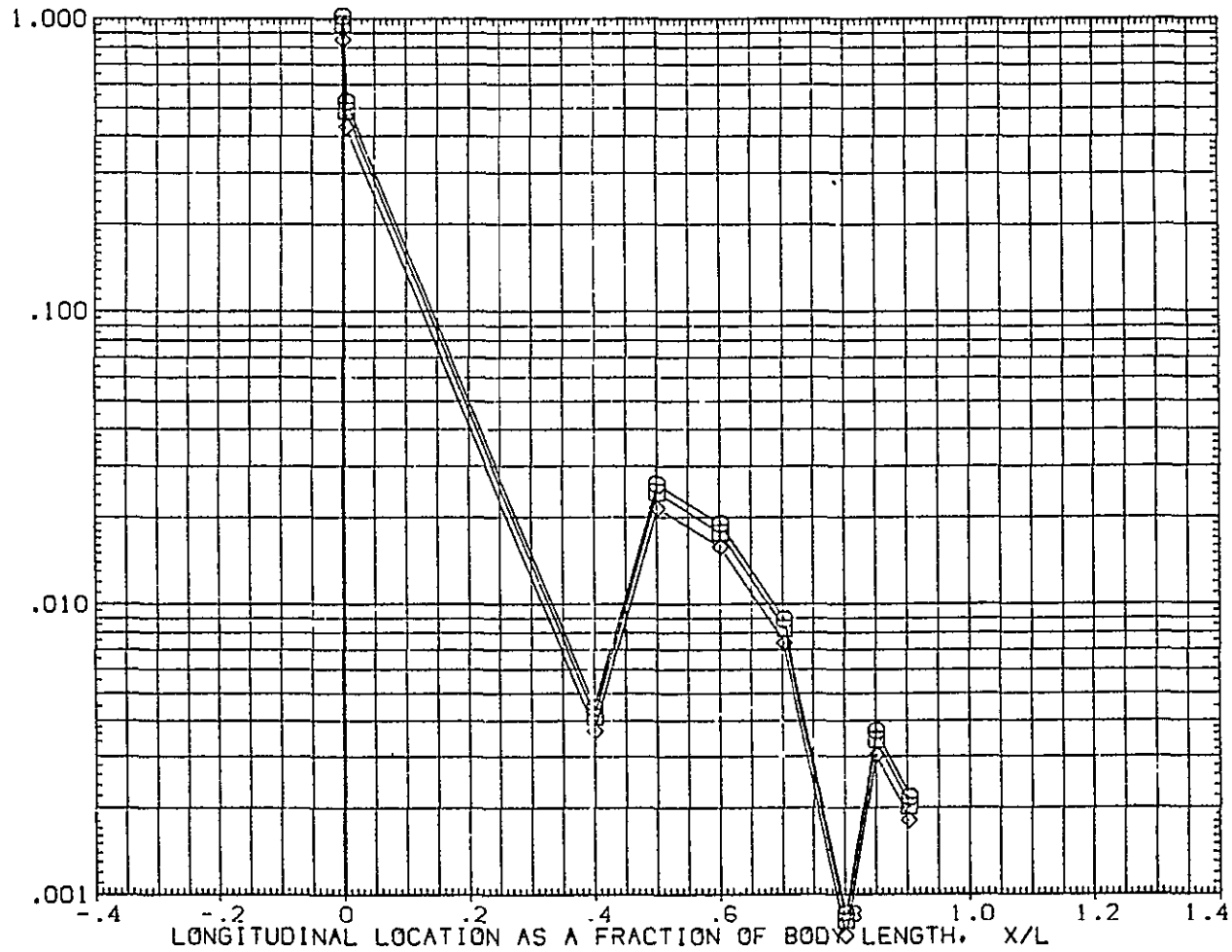


FIG. 14 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L2$ $\alpha = 0$

OH12/IH21 (CAL HST 173-100) 37 0 T TANK (RUGT14)

| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
|--------|--------|---------|--------|-------------------|------|-----------|
| ◇ | .850 | 241.000 | 16.000 | ALPHA | .000 | BETA .000 |
| □ | .900 | | | | | |
| ○ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, h/h_{REF}

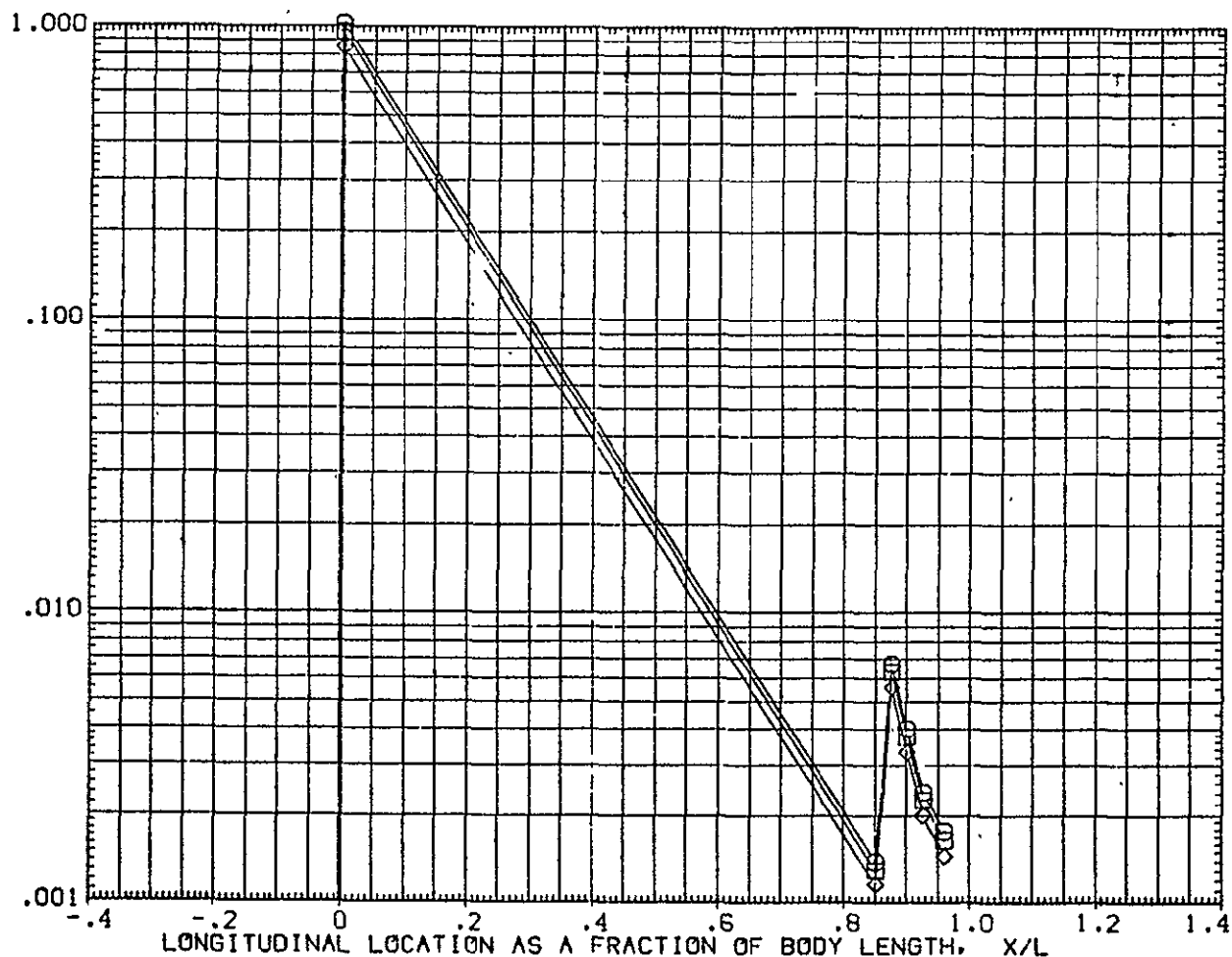


FIG. 14 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L2$ ALPHA = 0

0H12/1H21 (CAL HST 173-100) 37 0 T TANK (RUGT14)

| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
|--------|--------|---------|--------|-------------------|------|------|
| □ | .850 | 247.000 | 16.000 | ALPHA | .000 | BETA |
| ◇ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

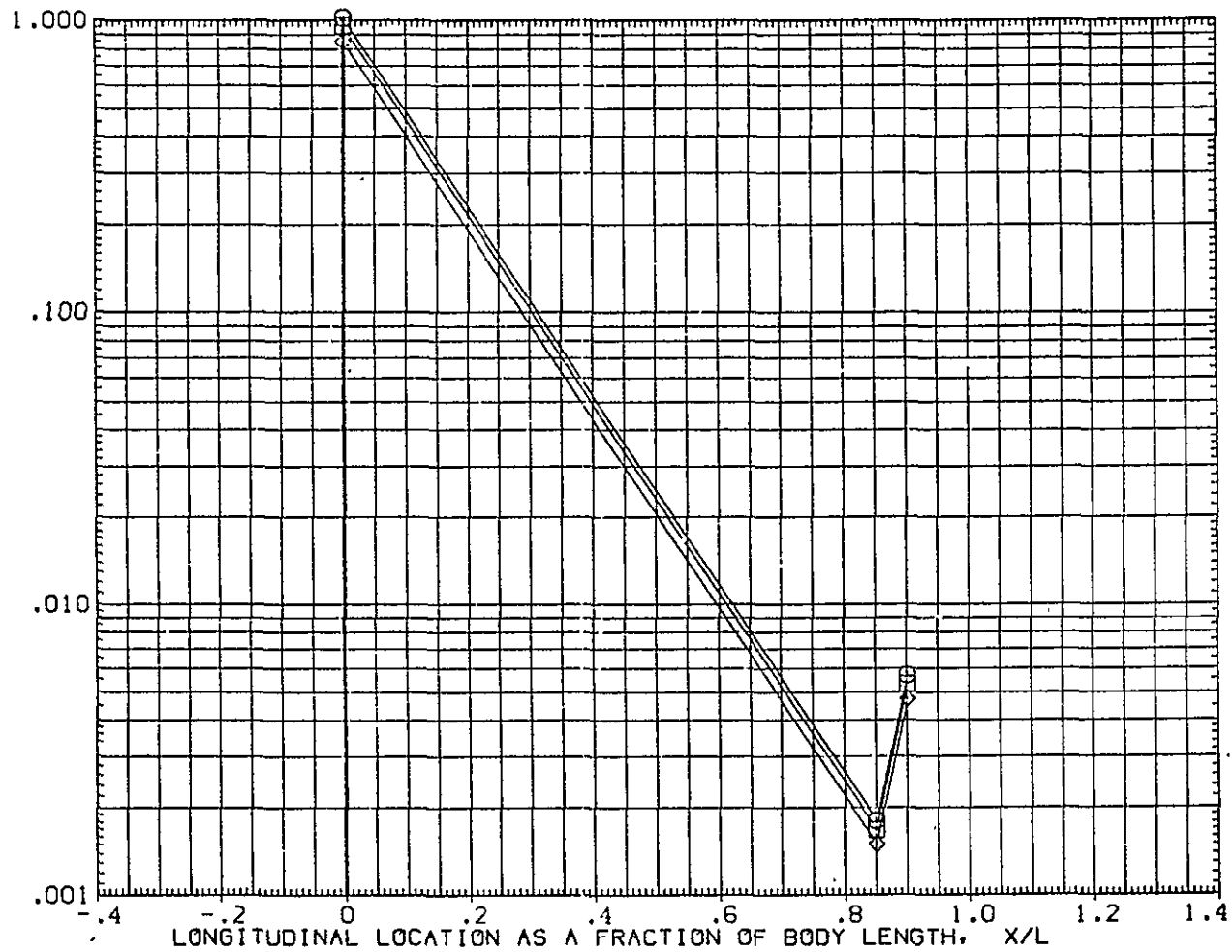


FIG. 14 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER RN/L^2 ALPHA = 0

REPRODUCIBILITY OF THIS
ORIGINAL PAGE IS POOR

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, h/h_{REF}

OH12/IH21 (CAL HST 173-100) 37 Q T TANK (RUGT14)

| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES |
|--------|--------|---------|--------|----------------------|
| ○ | .850 | 270.000 | 16.000 | ALPHA .000 BETA .000 |
| □ | .900 | | | |
| ◇ | 1.000 | | | |

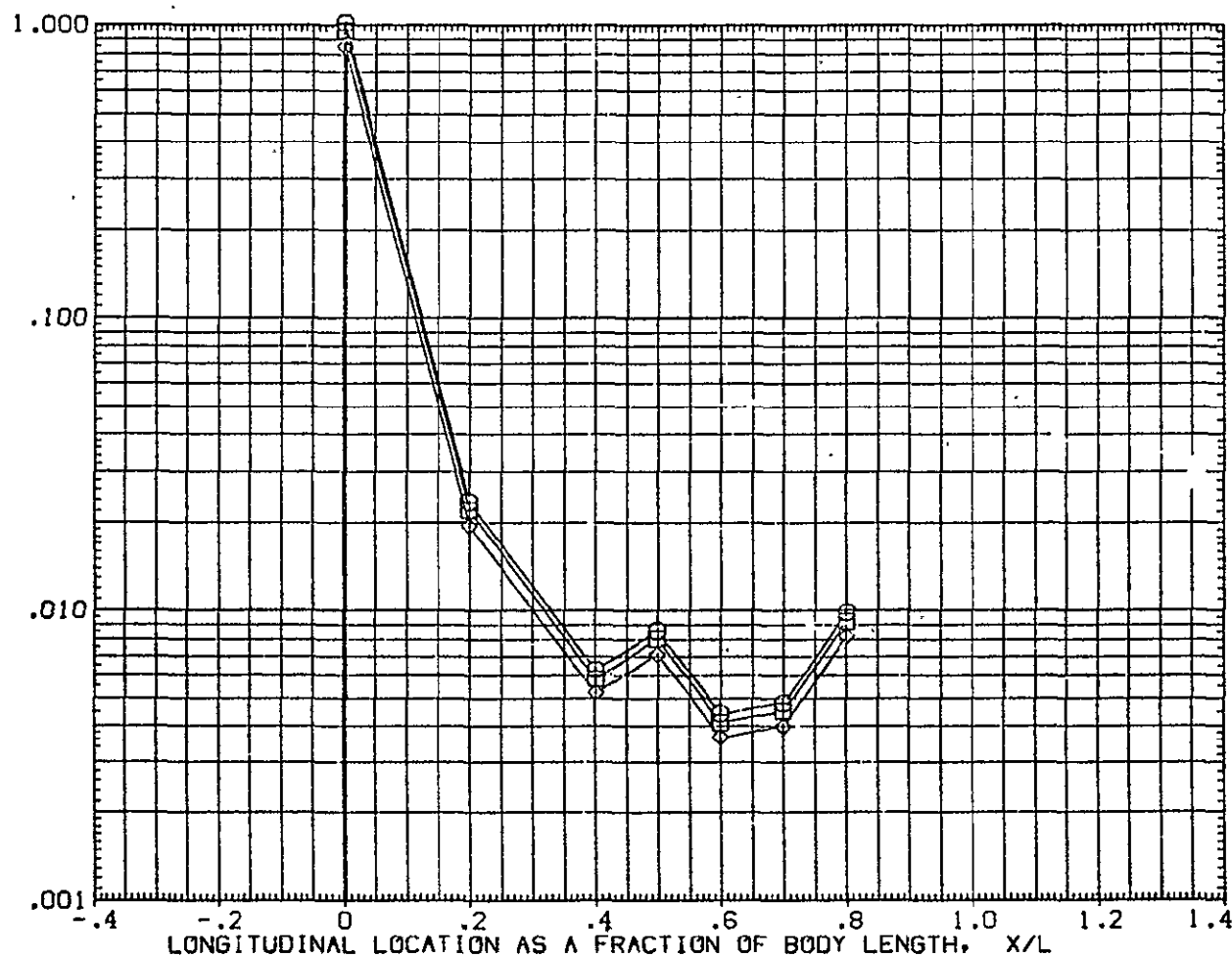


FIG. 14 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER $RN/L2$ ALPHA = 0

OH12/IH21 (CAL HST 173-100) 37 0 T TANK (RUGT14)

| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | |
|--------|--------|---------|--------|-------------------|------|
| | | | | ALPHA | BETA |
| ○ | .850 | 315.000 | 16.000 | .000 | .000 |
| □ | .900 | | | | |
| ◇ | 1.000 | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

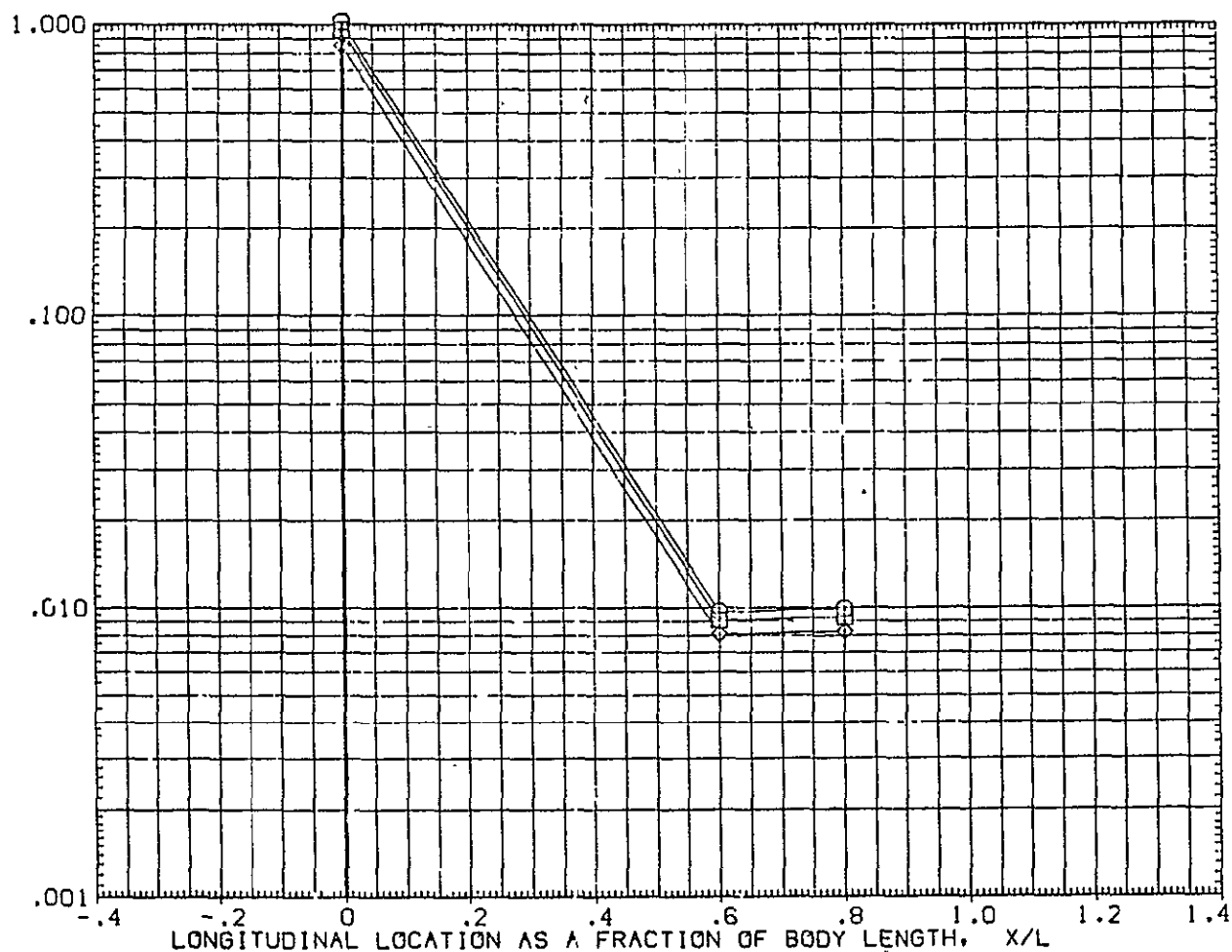


FIG. 14 EFFECT OF RECOVERY FACTOR ON THE E. TANK HEAT TRANSFER RN/L^2 ALPHA = 0

OH12/IH21 (CAL HST 173-100) 37 0 T FUSELAGE (RUGB14)

| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES |
|--------|--------|------|--------|----------------------|
| ○ | .850 | .003 | 16.050 | ALPHA .000 BETA .000 |
| □ | .900 | | | |
| ◇ | 1.000 | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/H_{REF}

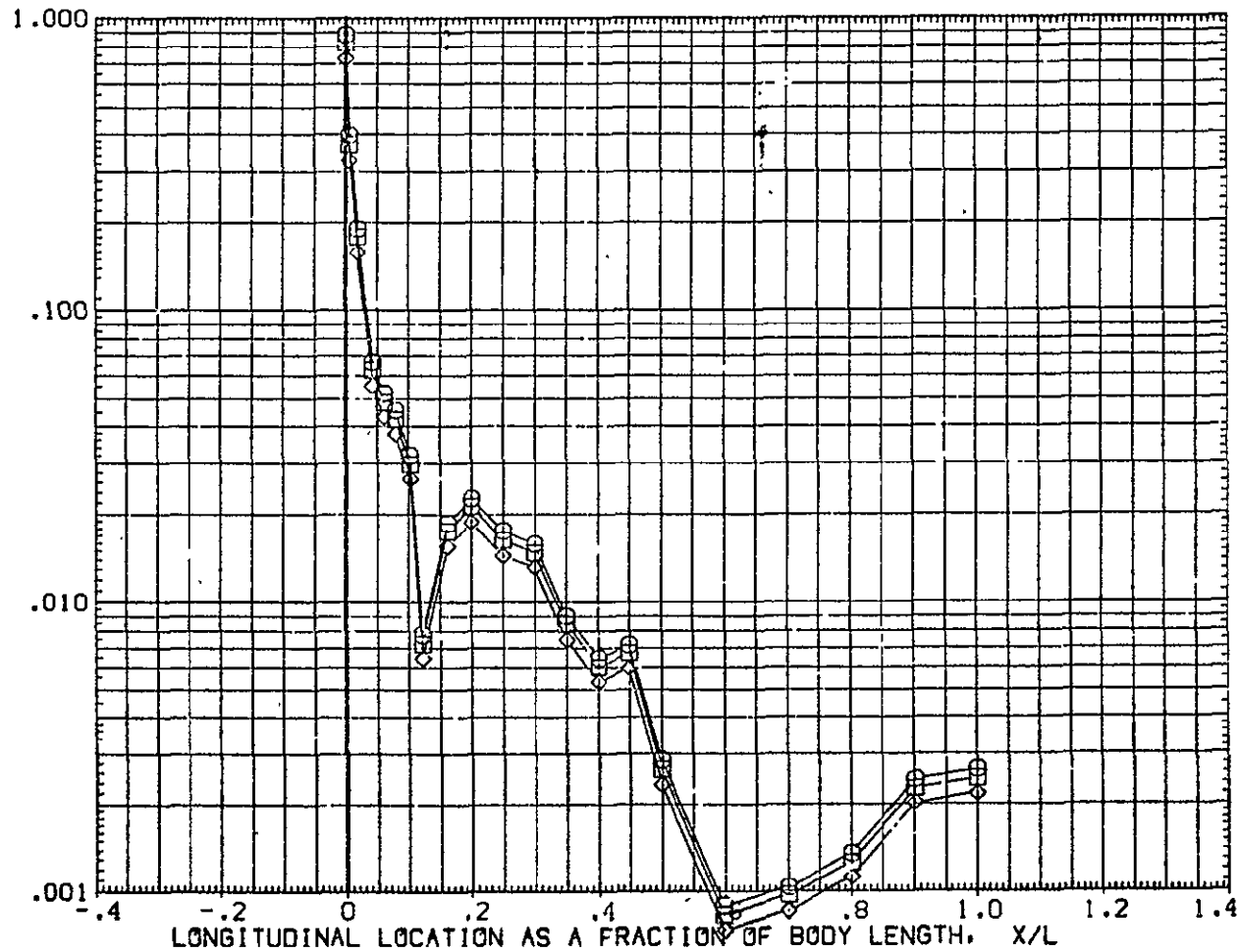


FIG. 15 EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER ALPHA = 0

0412/1H21 (CAL HST 173-100) 37 0 T FUSELAGE (PUGB14)

| | | | | | | |
|--------|---------|--------|--------|-------|-------------------|------|
| SYMBOL | HA #/HT | PHI | MACH | ALPHA | PARAMETRIC VALUES | |
| ◇ | .850 | 25.000 | 16.050 | .000 | BETA | .000 |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

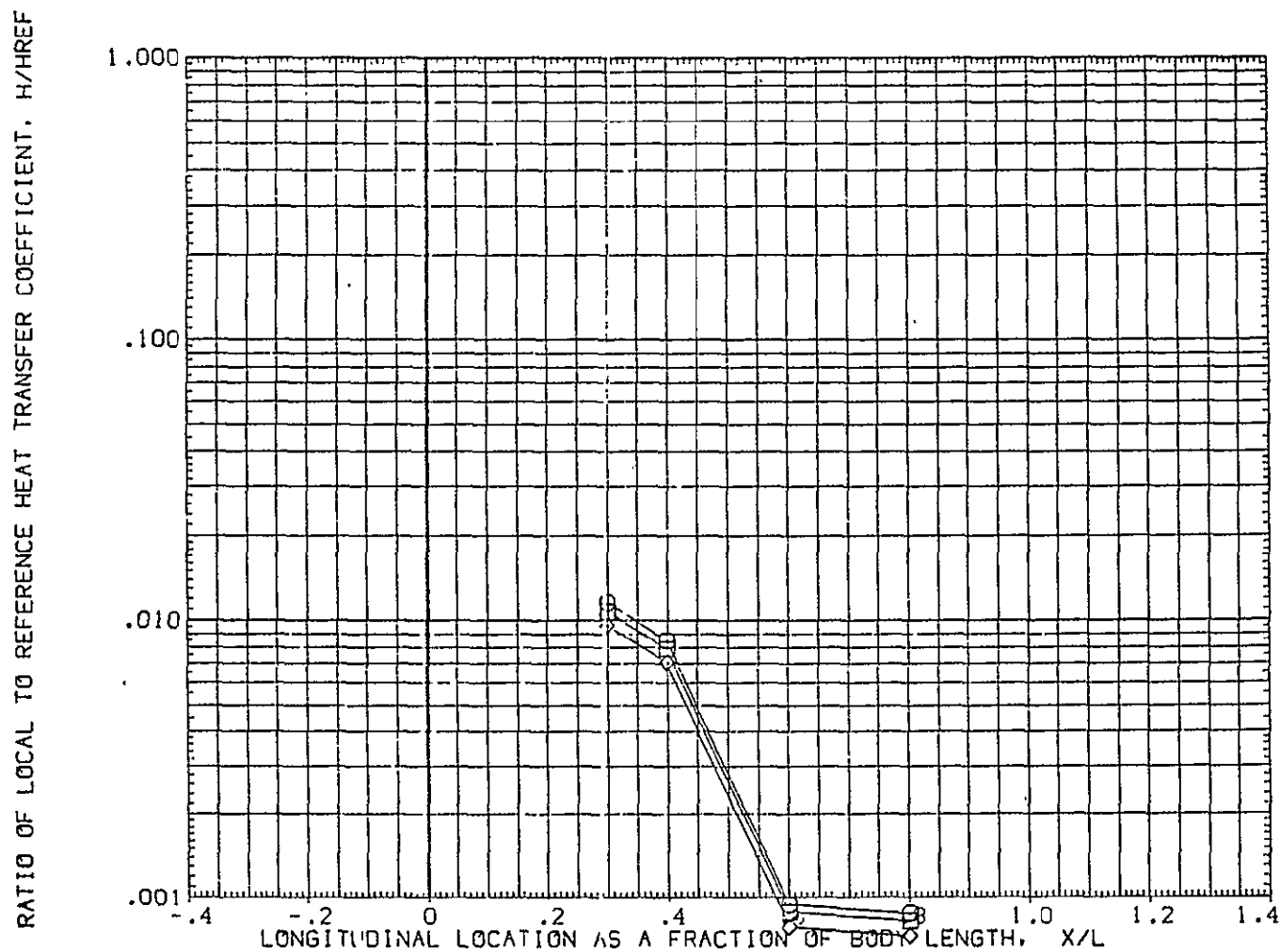


FIG. 15 EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER $\alpha = 0$

0H12/1H21 (CAL HST 173-100) 37 0 T FUSELAGE (RUGB14)

| SYMBOL | HAW/HT | PHI | MACH | ALPHA | PARAMETRIC VALUES | | BETA | |
|--------|--------|--------|--------|-------|-------------------|--|------|------|
| ○ | .850 | 30.000 | 16.050 | | .000 | | | .000 |
| □ | .900 | | | | | | | |
| ◇ | 1.000 | | | | | | | |

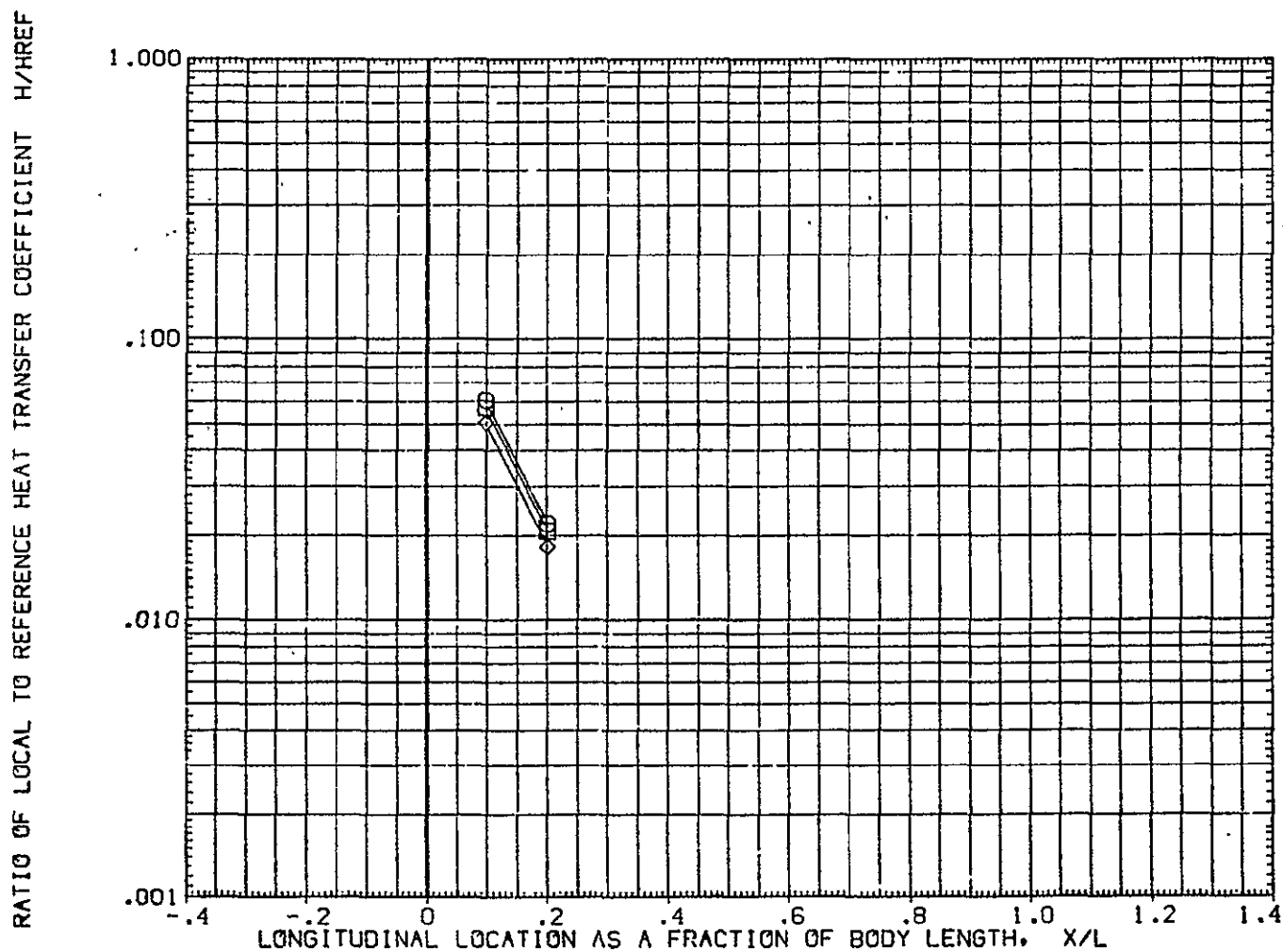


FIG. 15 EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER $\alpha = 0$

0H12/1H21 (CAL HST 173-100) 37 0 T FUSELAGE (RUGB14)

| | | | | | | |
|--------|--------|---------|--------|-------------------|------|------|
| SYMBOL | HAW/HT | PHI | MACH | PARAMETRIC VALUES | | |
| ○ | .850 | 180.000 | 16.050 | ALPHA | .000 | BETA |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

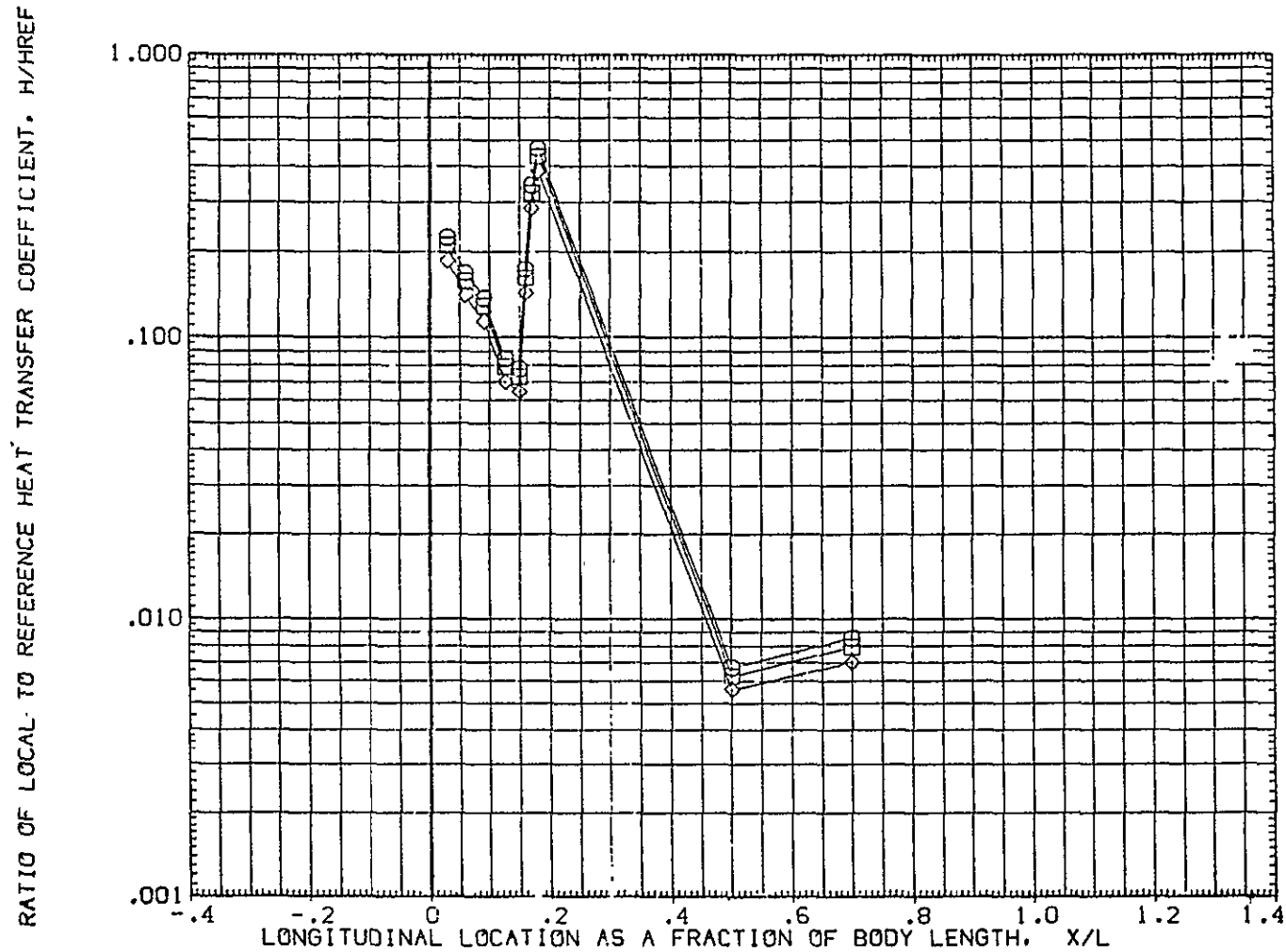


FIG. 15 EFFECT OF RECOVERY FACTOR ON THE ORBITER BODY HEAT TRANSFER $\alpha = 0$

OH12/IH21 (CAL HST-173-100) 37 0 T WING L.S.(RUGW14)

| | | | | |
|--------|--------|------|--------|----------------------|
| SYMBOL | HAW/HT | ZY/B | MACH | PARAMETRIC VALUES |
| ○ | .850 | .250 | 15.050 | ALPHA .000 BETA .000 |
| □ | .900 | | | |
| ◇ | 1.000 | | | |

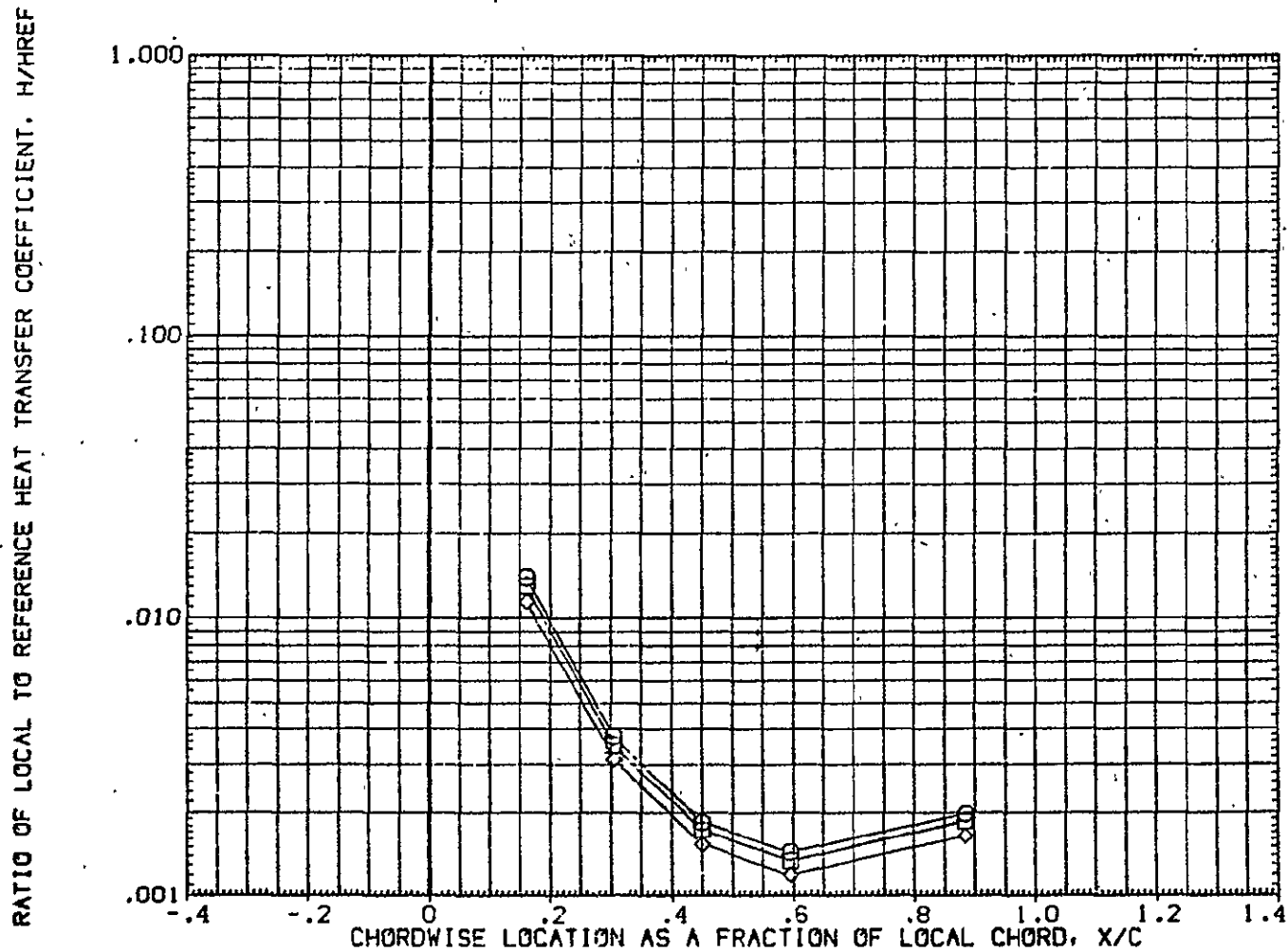


FIG. 16 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER ALPHA = 0

OH12/IH2! (CAL HST 173-100) 37 0 T WING L.S.(RUGW14)

| | | | | | | |
|--------|--------|------|--------|-------------------|------|------|
| SYMBOL | HAW/HT | 2Y/B | MACH | PARAMETRIC VALUES | | |
| ○ | .850 | .400 | 16.050 | ALPHA | .000 | BETA |
| ◇ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, h/h_{REF}

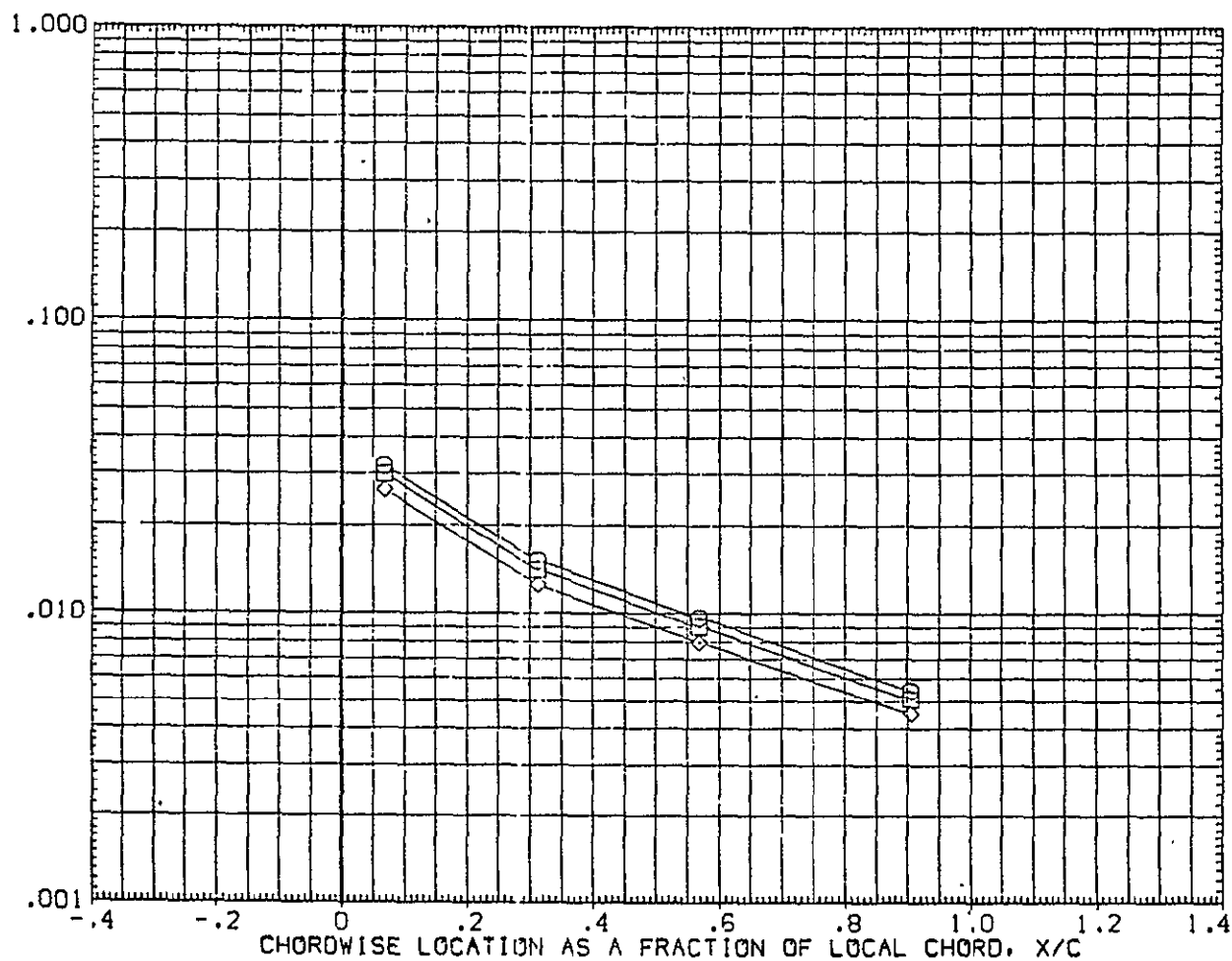


FIG. 16 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER $\alpha = 0$

0H12/1H21 (CAL HST 173-100) 37 0 T WING L.S.(RUGW14)

| SYMBOL | HAW/WT | ZY/B | MACH | PARAMETRIC VALUES | | |
|--------|--------|------|--------|-------------------|------|--|
| | | | | ALPHA | BETA | |
| ○ | .850 | .500 | 16.050 | .000 | | |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

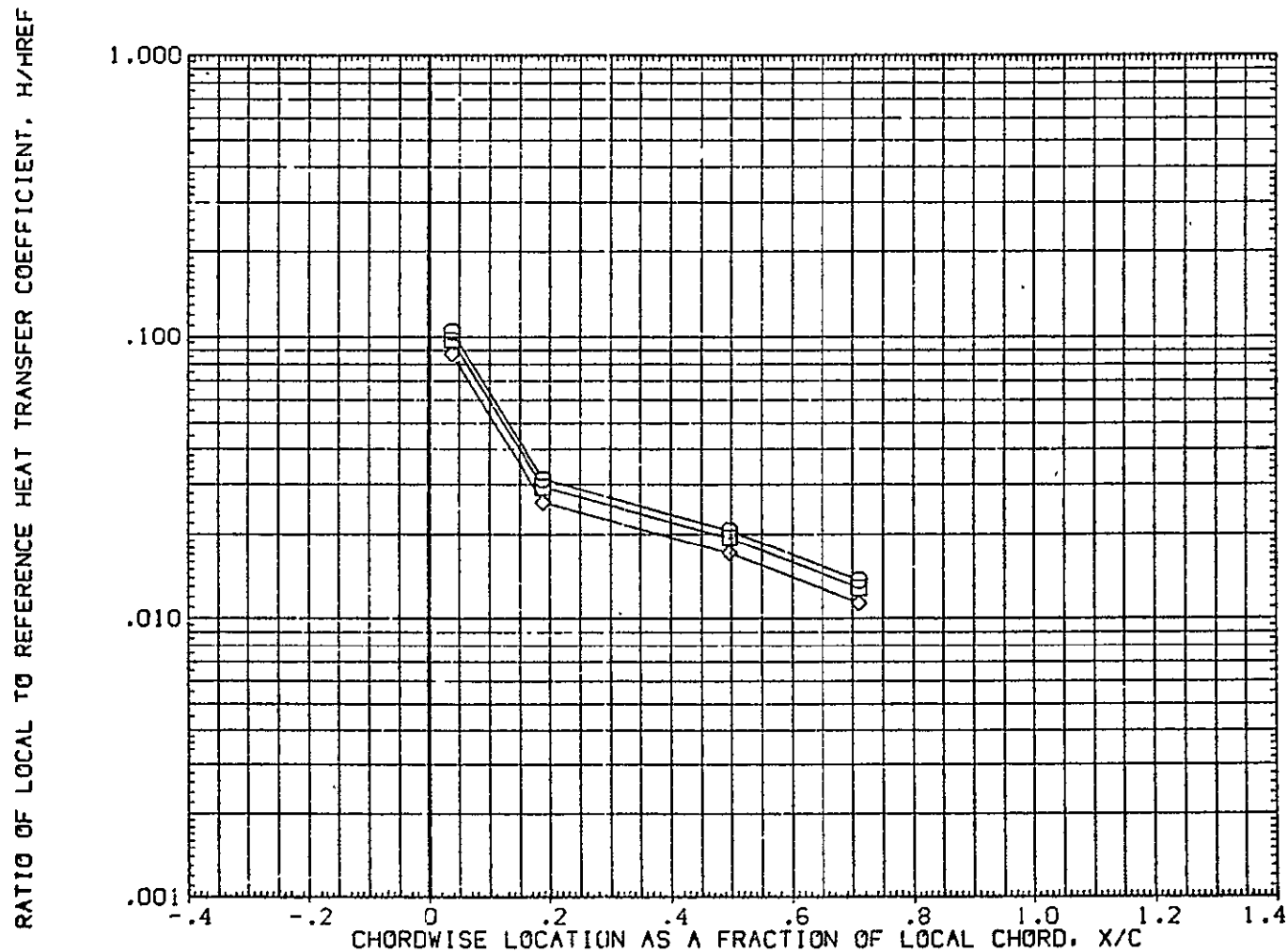


FIG. 16 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER $\alpha = 0$

OH12/IH21 (CAL HST 173-100) 37 0 T WING L.S.(RUGW14)

| SYMBOL | HAW/HT | 2Y/B | MACH | PARAMETRIC VALUES | | |
|--------|--------|------|--------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| ○ | .850 | .600 | 16.050 | .000 | | .000 |
| □ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

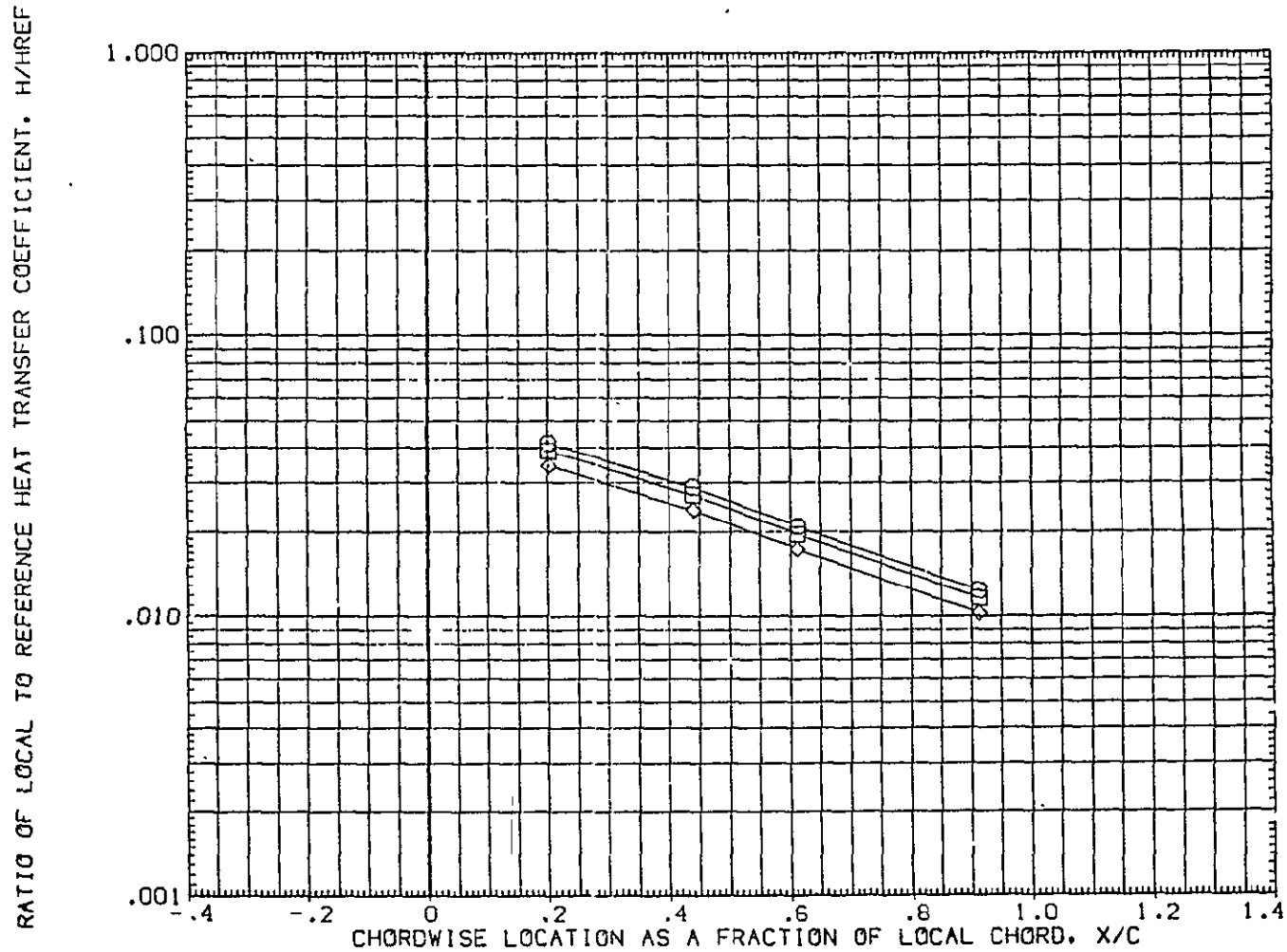


FIG. 16 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER ALPHA = 0

OR12/1H21 (CAL HST 173-100) 37 0 T WING L.S.(RUGW14)

| SYMBOL | HAW/HT | 2Y/B | MACH | PARAMETRIC VALUES | | |
|--------|--------|------|--------|-------------------|------|------|
| | | | | ALPHA | BETA | |
| □ | .850 | .750 | 16.050 | .000 | .000 | .000 |
| ◇ | .900 | | | | | |
| ◇ | 1.000 | | | | | |

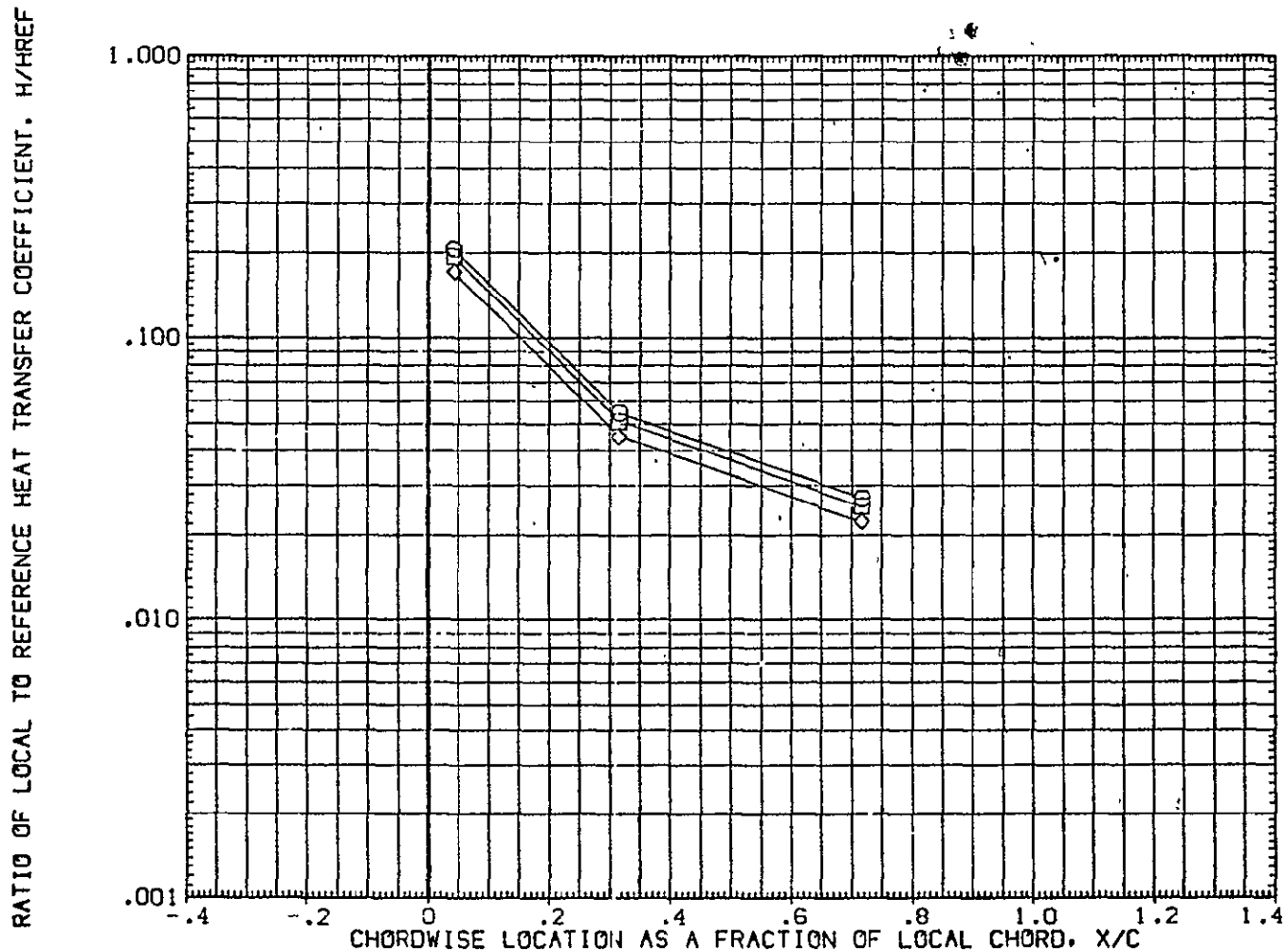


FIG. 16 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER ALPHA = 0

REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR.

OH12/IH21 (CAL HST 173-100) 37 0 T WING L.S.(RUGW14)

| | | | | | | |
|--------|--------|------|--------|-------------------|------|------|
| SYMBOL | HAW/HT | 2Y/B | MACH | PARAMETRIC VALUES | | |
| ◇ | .850 | .950 | 16.050 | ALPHA | .000 | BETA |
| ◇ | .900 | | | | | .000 |
| ◇ | 1.000 | | | | | |

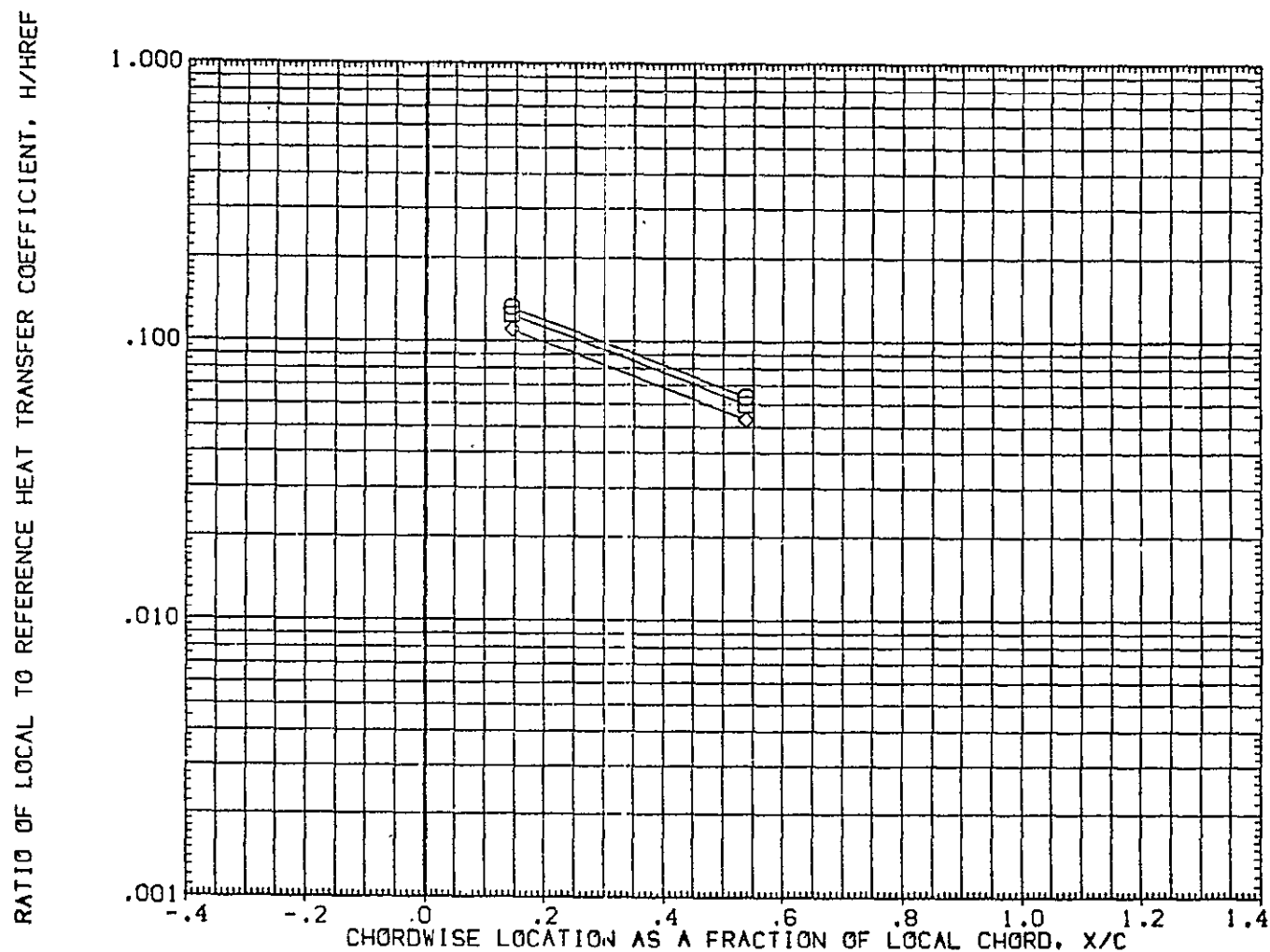


FIG. 16 EFFECT OF RECOVERY FACTOR ON THE ORBITER WING HEAT TRANSFER ALPHA = 0

OH12/IH21 (CAL HST 173-100) 37 0 T VERTICAL (RUGV14)

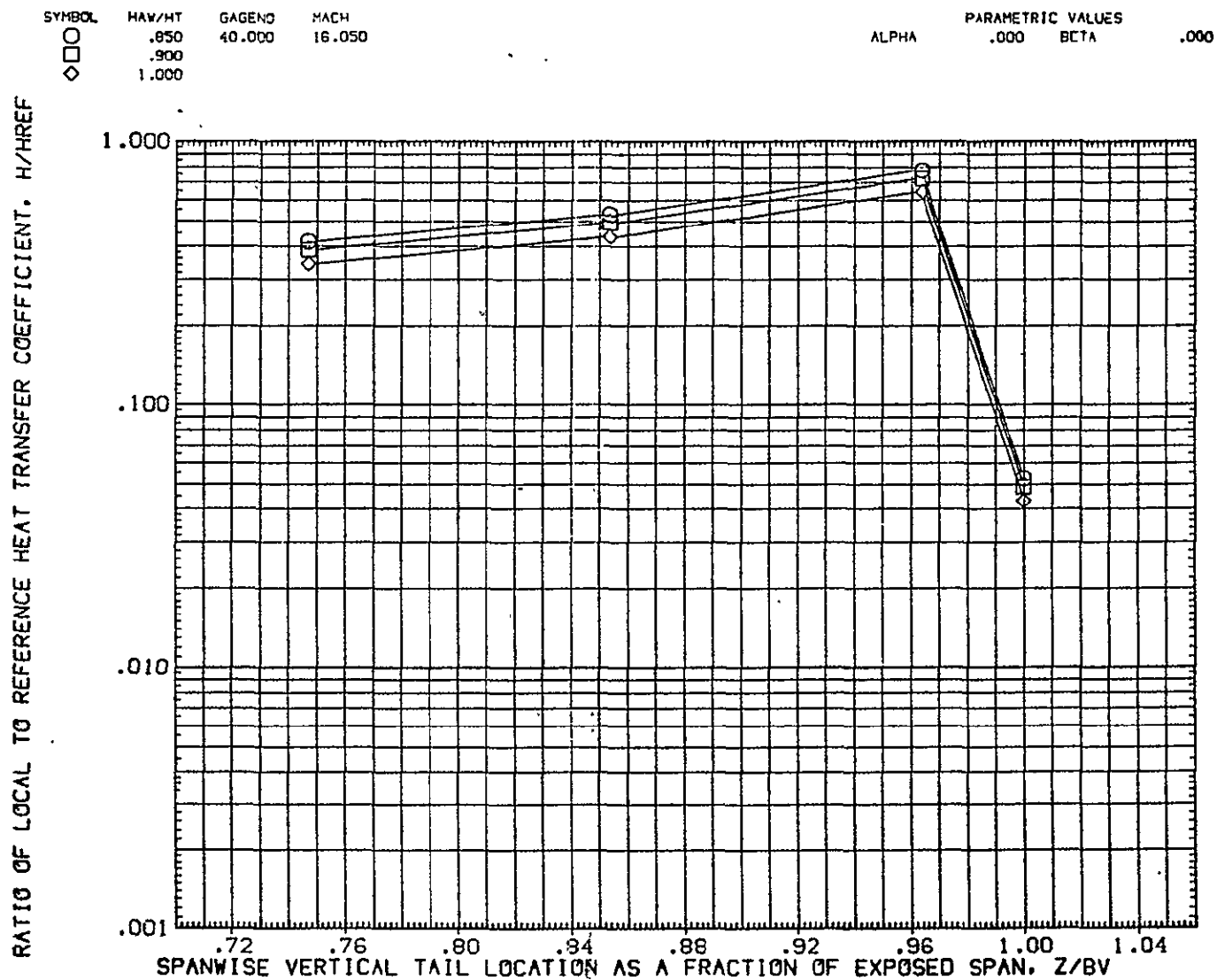


FIG. 17 EFFECT OF RECOVERY FACTOR ON THE ORBITER TAIL HEAT TRANSFER ALPHA = 0